

CTO

THE MAGAZINE FOR INFORMATION EXECUTIVES

OCTOBER 1, 1993
VOLUME SEVEN NUMBER ONE
SEVEN DOLLARS

COVER STORY

Missing Links

*How To Perform
The Death-Defying
Data-Integration Trick*

ALSO INSIDE

**Thinking Globally,
Acting Regionally**

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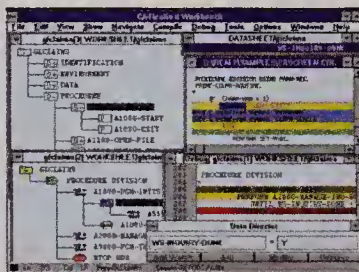
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CIO

VOLUME 7, NUMBER 1

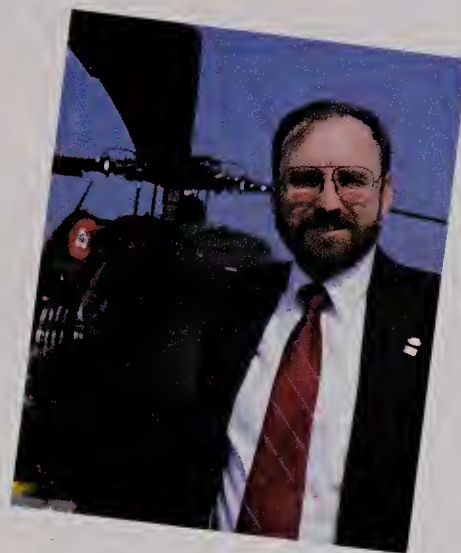
COVER STORY

DATABASE MANAGEMENT

54

Missing Links

Linking disparate databases is such a knotty issue that some who have tried say it can't be done at all. But for those struggling down the rocky road to integration, achieving universal data access is worth it. *By Richard Pastore*



Mergers and disposition 54
Cover photo by Kent Hanson

FEATURES

INFORMATION INFRASTRUCTURE

44

Information and Access for All

The national information infrastructure will have a profound effect on the way companies operate, our nation's competitiveness and our very social structure. MIT President Charles M. Vest, co-chairman of the 21st Century Information Infrastructure Project, explains why. *By Leigh Buchanan*

THE GLOBAL ENTERPRISE

62

Continental Divides

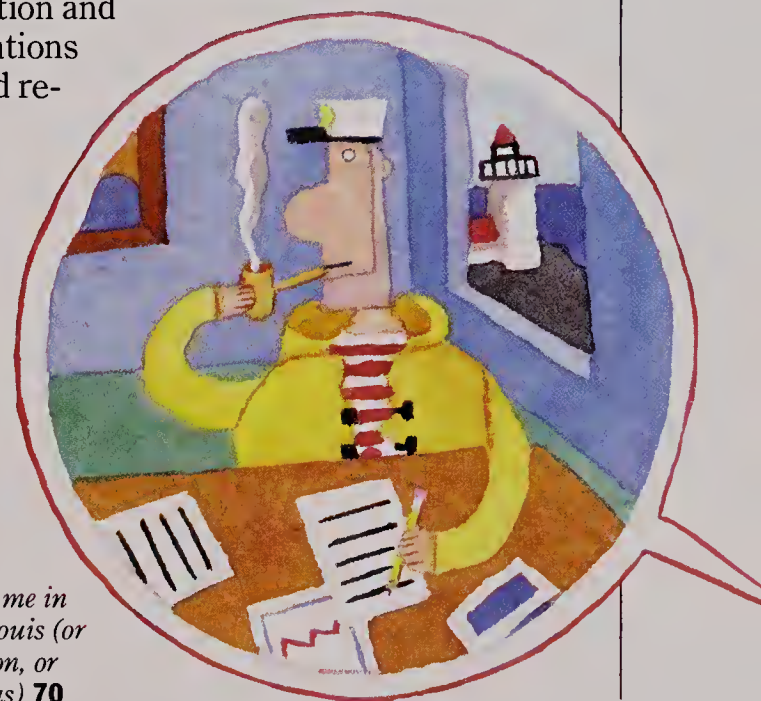
For many multinational companies, the world is simply too big a place for central control to be manageable. Regionalization offers the increased coordination and economies of scale of global operations while retaining local flexibility and responsiveness. *By Allan Alter*

ELECTRONIC MEETINGS

70

Some Next-Best Things To Being There

Meetings may never be the same, now that an increasingly rich assortment of video, audio, graphical and hybrid electronic tools puts remote participants virtually in touch with the agenda. *By Lucie Juneau*



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COLUMNS

PERFORMANCE METRICS

28

INSIGHTS: TAKING NEW MEASURES

IS departments that want to improve performance should stop naval-gazing and start considering how they measure up against other companies—and in the eyes of their customers.

By Chandran Sankaran and Henry D. Taylor Jr.

CIO/CEO RELATIONSHIPS

38

FIRST PERSON: A BETTER UNDERSTANDING

There are faults on both sides of the long-standing gap between CEOs and CIOs. But IS executives can bridge that divide by adopting a service orientation—and win a place at the strategy-setting table into the bargain.

By Daniel Barth



Bridging the gulf 38

CAREER DEVELOPMENT

80

HUMAN FACTORS: CAREER UPLIFT

At Texas Instruments' Employee Development Center, IS professionals help peers who feel trapped in unfulfilling careers. *By Sue Patterson*



A bright future 84

FIBER OPTICS

84

STATE OF THE ART: THE SPEED OF LIGHT

A growing need to move large amounts of data quickly among workstations is inspiring many managers to give fiber optics another look. *By John Edwards*

AUTOMATED SCHEDULING

96

WORKING SMART: MAINTAINING THE JET SET

A new maintenance-scheduling system has dramatically reduced the number of unanticipated layovers for Northwest Airlines' aircraft. *By Melanie Menagh*

DEPARTMENTS

Editor's Letter 10

Publisher's Letter 14

Trendlines 18

- IBM marketing
- Pen computing
- Calendar of events
- North Carolina brochure
- Career moves
- HMO follow-ups
- Digital editing
- Service providers
- Electronic partnerships
- CIO salaries
- Toll booth terror

FYI 92

Index 94

A large yellow robotic arm, resembling a crane or a specialized robot, is positioned on the left side of the frame. It is reaching its articulated arm into a tall, white server rack that occupies the right side of the image. The rack has multiple horizontal slots, some of which appear to contain tape drives. The background is dark, making the yellow arm and the white rack stand out.

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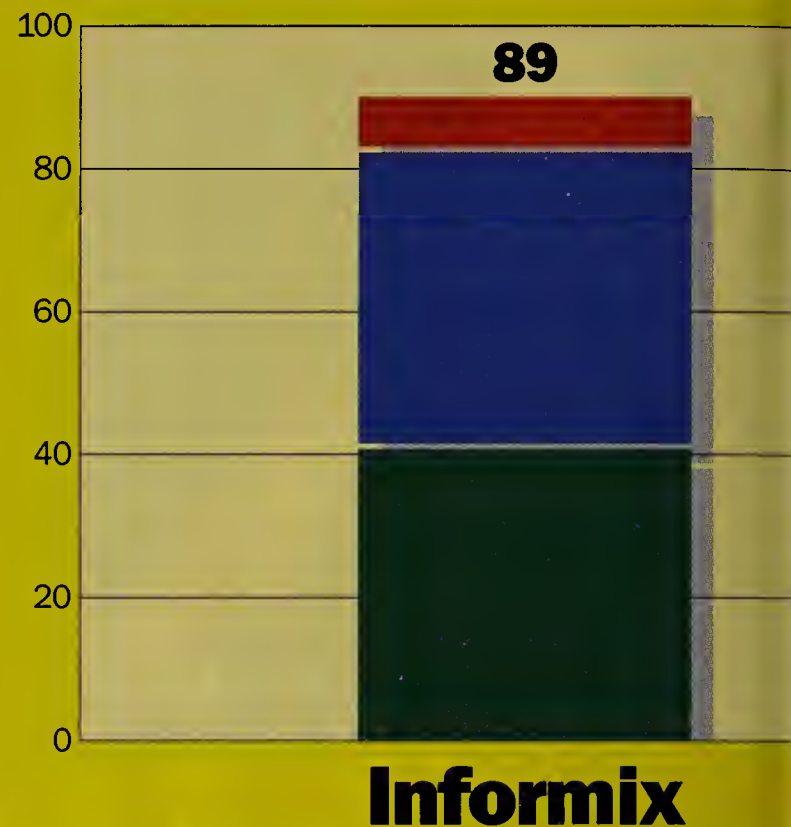
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*UNIX TPC-audited benchmarks published by hardware manufacturers as of 9/1/93.

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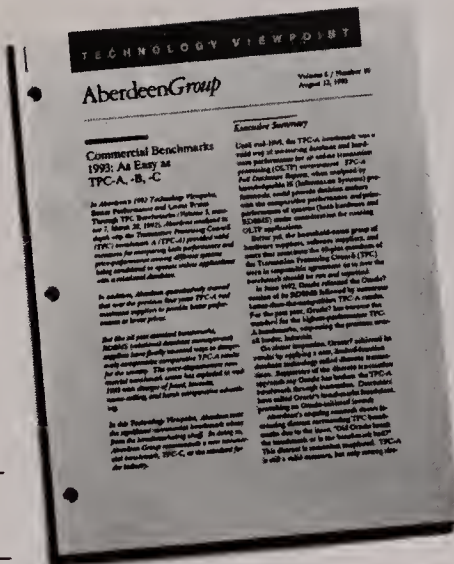
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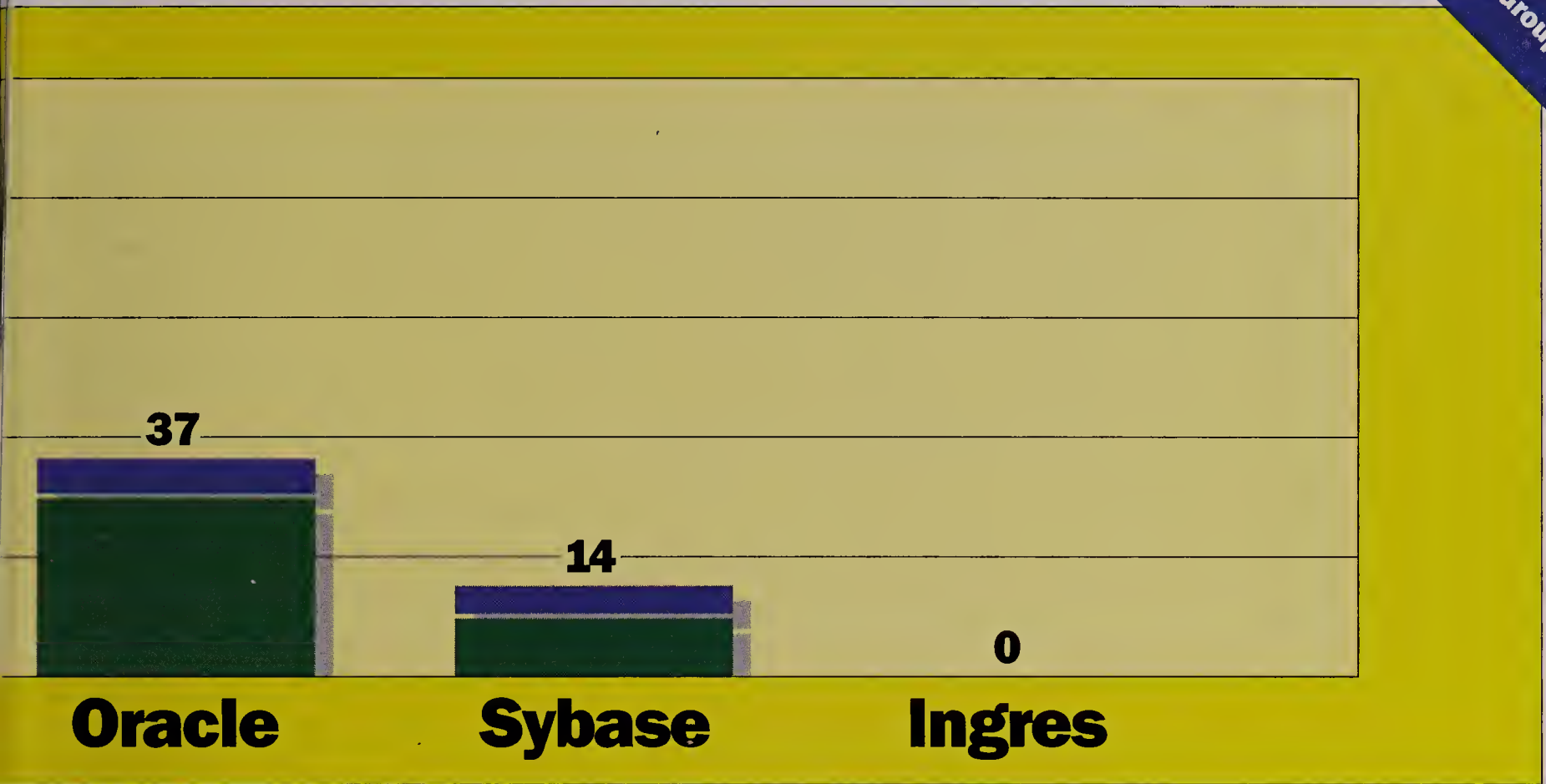
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Source: Transaction Processing Performance Council (TPC), 1993.

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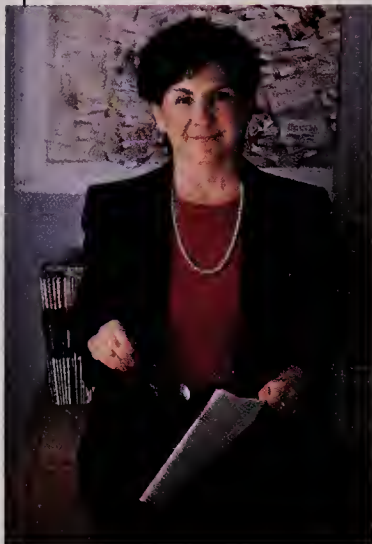
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By facilitating communication among people, information technology can make the world a smaller, perhaps friendlier place. Could it be that the warm and fuzzy feelings aroused in those long-distance telephone ads are right around the corner for the world citizenry?

Two of the stories in this issue demonstrate the potential—and the pitfalls—of being able to access information and communicate across vast networks. Focusing on the concept of the information infrastructure, Associate Editor Leigh Buchanan interviewed MIT President Charles M. Vest recently. Vest is co-chairman of the 21st Century Information Infrastructure

Project, which is part of the Council on Competitiveness, a private, nonprofit coalition of CEOs (see “Information and Access for All,” on Page 44). Vest foresees the infrastructure creating business and educational opportunities by fostering more cooperation among organizations and between the private and public sectors—a network of networks, if you will. It is important for CIOs to see where their organizations fit into the connected society.

The Council sees a major challenge in having these networks serve the national interest. This would require cooperation and open discussion among participants. Vest is optimistic that such cross-pollination can occur, despite the fact that there are contradictory viewpoints on just what constitutes national interest. But who knows what the future will bring?

An intriguing point discussed by Vest and Buchanan was the possible creation of “information have-nots,” an updated version of disenfranchised citizenry. With the increasing ethnic and educational diversity of the population in this country, there is a great risk for people not having the ability to take advantage of the evolving information infrastructure.

Although building an infrastructure in this country is a work in process, globalization is a competitive reality for corporations. The ability to create a successful global network has been a daunting task for many firms. “Continental Divides,” on Page 62, looks at some new twists on creating global communications based on the experiences of 3M. In particular, 3M has launched a strategy of regionalization, noting that customers are becoming European rather than one-country customers.

Executives must realize that the Earth is becoming a more-connected planet.

Marcia Blumenthal



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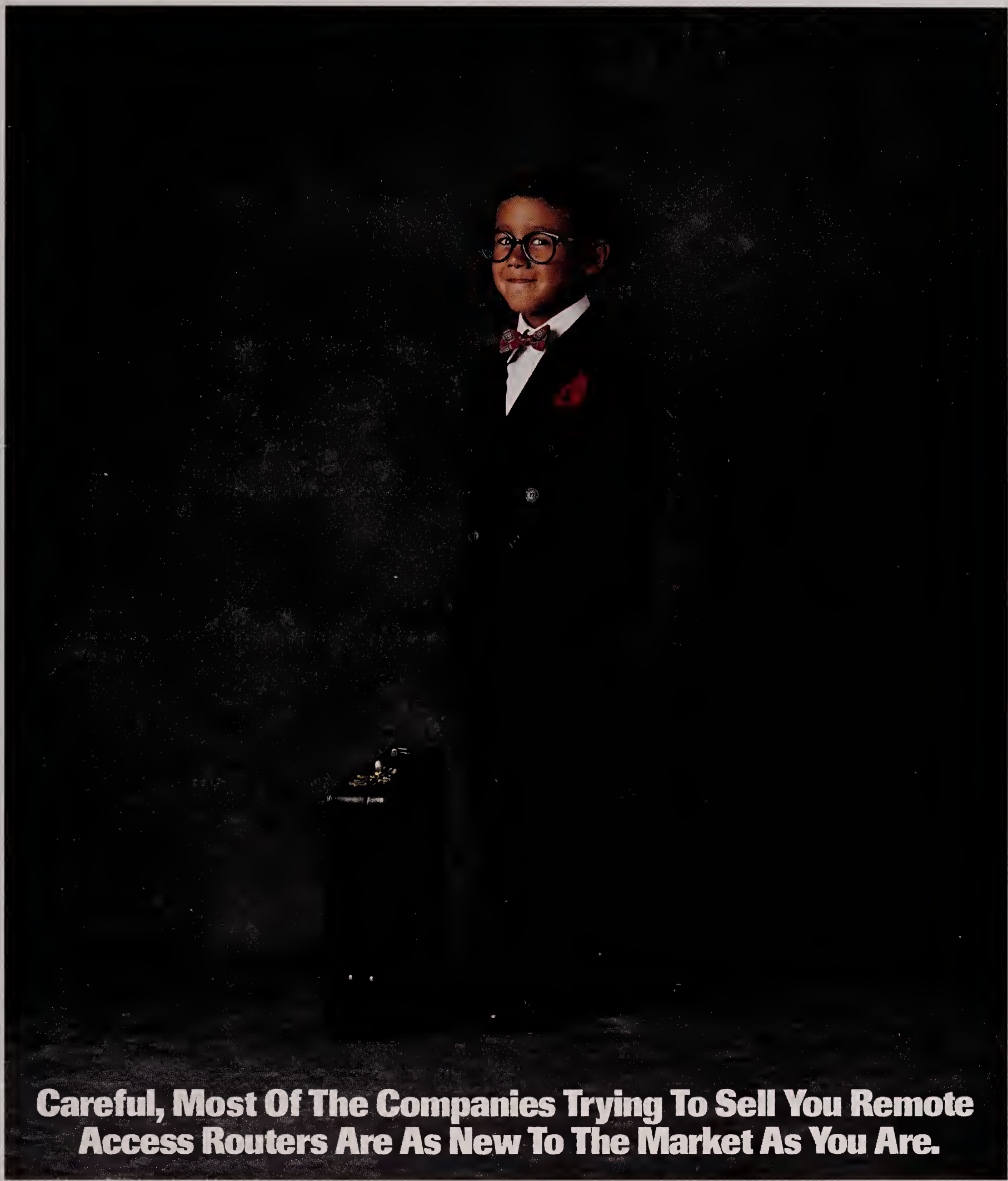


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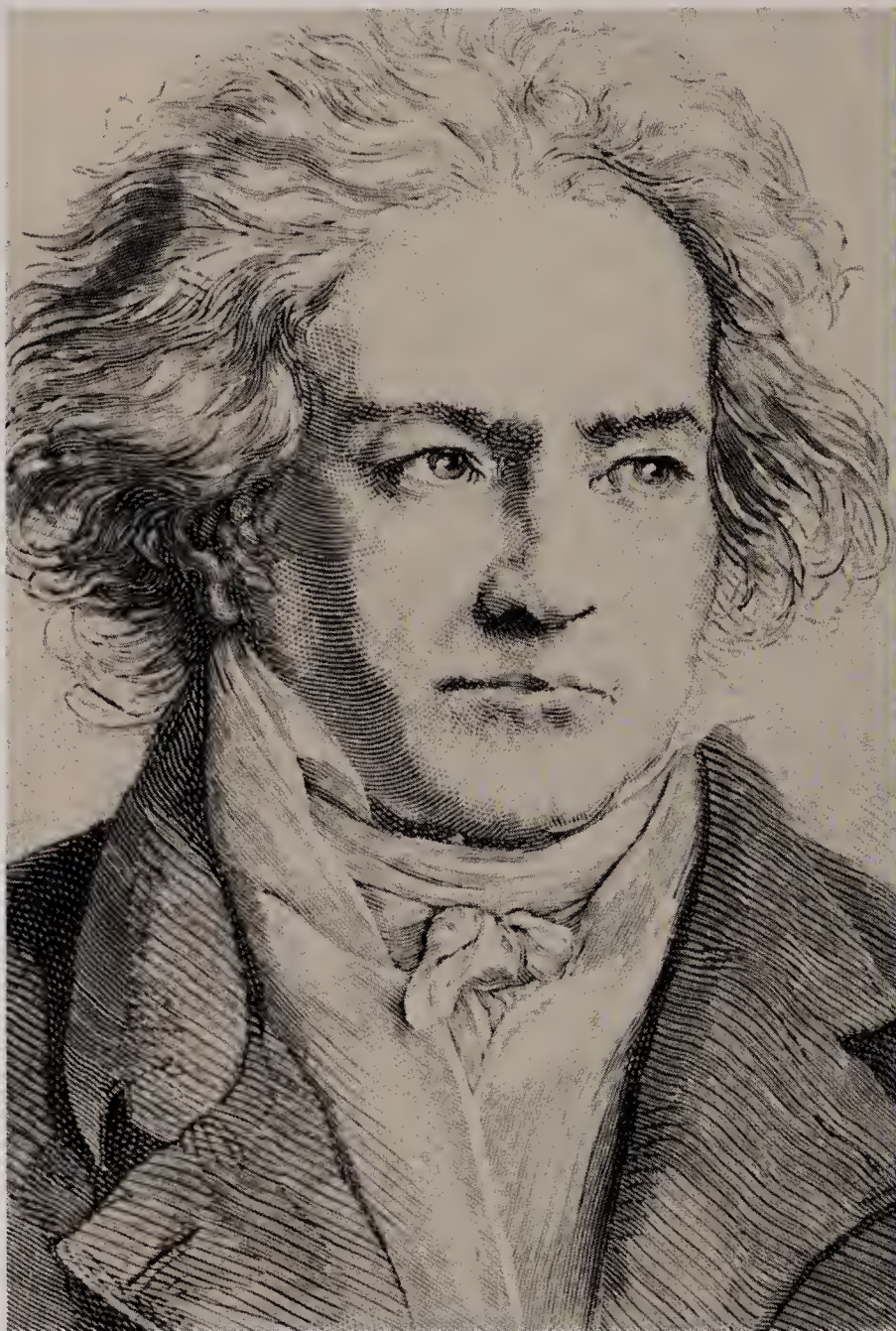
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Many of you rely on *CIO* to provide case studies of how other companies are leveraging IT to achieve corporate goals and bottom-line business value. With business pressures mounting and new technologies constantly emerging, you'll need all the technology-management information you can get your hands on.

With that in mind, I'm pleased to announce that *CIO* Magazine will publish 21 issues in 1994. The change starts with a combined Dec. 15/Jan. 1 issue that will hit your desks around Christmas. After that, *CIO* will be delivered on the 1st and 15th of every month, except in July and August when one

issue per month will be published.

Change is inherent in the high-tech industry, and *CIO* must keep evolving and growing to help you keep pace. Just five years ago, issues like reengineering and managing dispersed systems were low priorities among IS executives. Today they rank 1 and 5 respectively on the CSC Index. And new challenges are popping up every day. Two issues a month will give us the latitude we need to address more of your concerns, more often.

We're extremely enthusiastic about this change and are committed to retaining the quality, thoroughness and high-level focus you've come to expect from us. I'll be looking forward to getting your feedback. If you have questions or suggestions, don't hesitate to call me at 508 935-4601. Or write to me at CIO Publishing, 492 Old Connecticut Path, P.O. Box 9208, Framingham, MA 01701.

Wayne L. Woz

P.S. The next CIO Perspectives Conference, "The Politics of IT: Re-ordering The Enterprise," is right around the corner. The conference will take place Oct. 17-20 at the Westin Mission Hills in Rancho Mirage, Calif. Please call our toll-free registration hot line at 800 366-0246.

Coming In CIO

Leading Edge

CIOs are increasingly pressed to show their leadership mettle. Some observers believe that as organizations reengineer—and as line managers develop a greater appreciation for the strategic value of technology—effective leadership skills will separate the successful CIOs from the also-rans. *CIO* examines what it takes to be a leader and talks to a few IS executives who have the right stuff.

It's A Dirty Job, But...

With its product offerings jumping from 10,000 to more than 50,000 in five years, Andersen Corp. had to reengineer its inventory system and develop a point-of-sale system in an effort to streamline the process of preparing price quotes. The success of the project has prompted top management at the window manufacturer to appoint the CIO as head of all reengineering projects.

Some Simulating Experiences

Computer-aided simulation is being used in a broad range of companies for a surprising variety of purposes. Organizations that have employed the technology describe how it has allowed them to prevent costly mistakes in business-process reengineering, modify employees' on-the-job attitudes and predict everything from assembly-line bottlenecks to a competitor's next strategic move.

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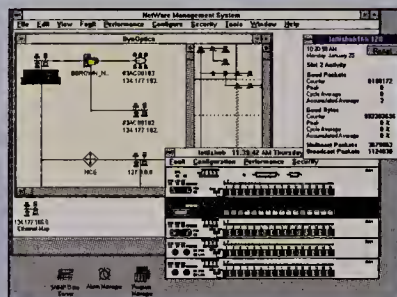
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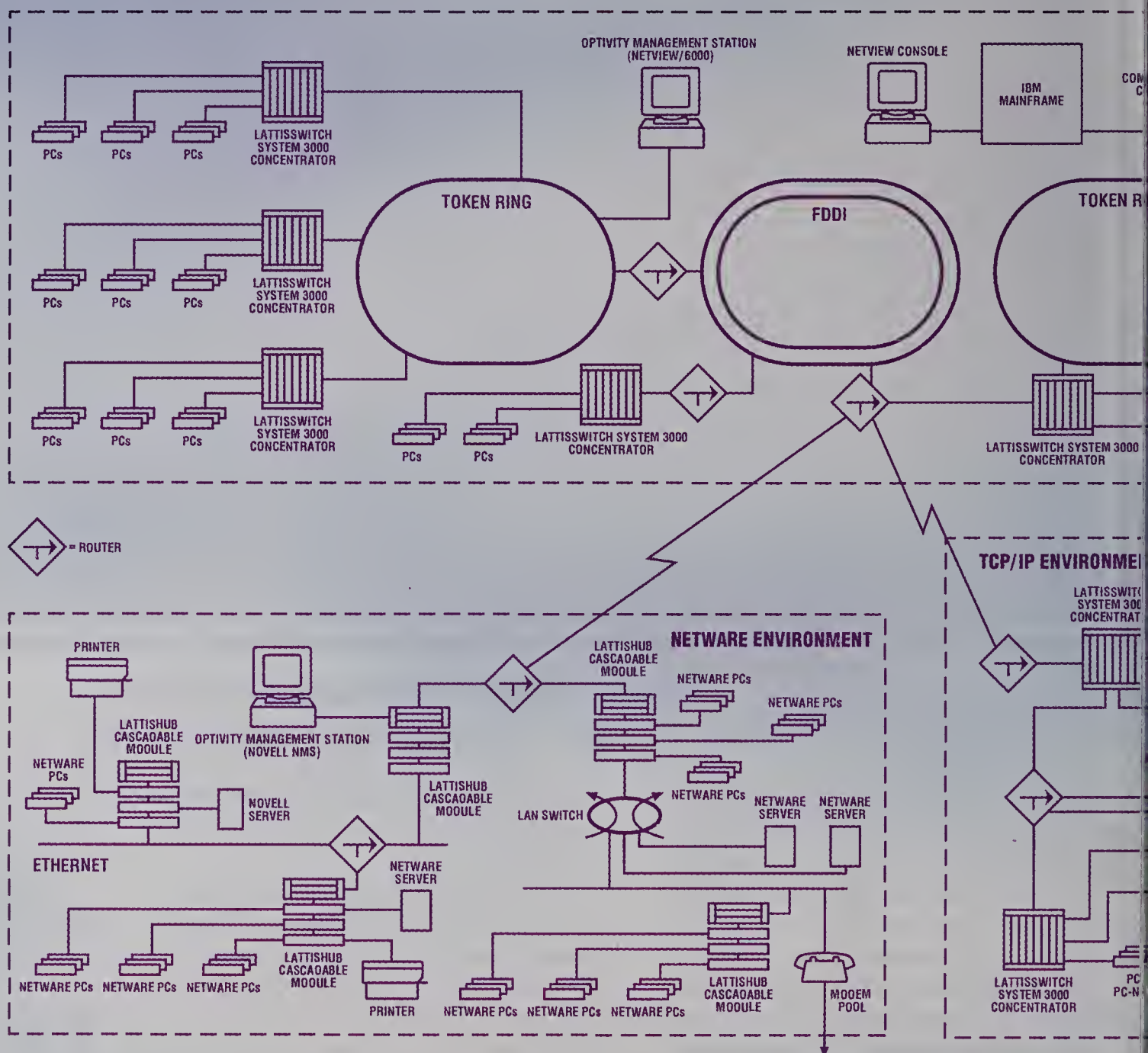
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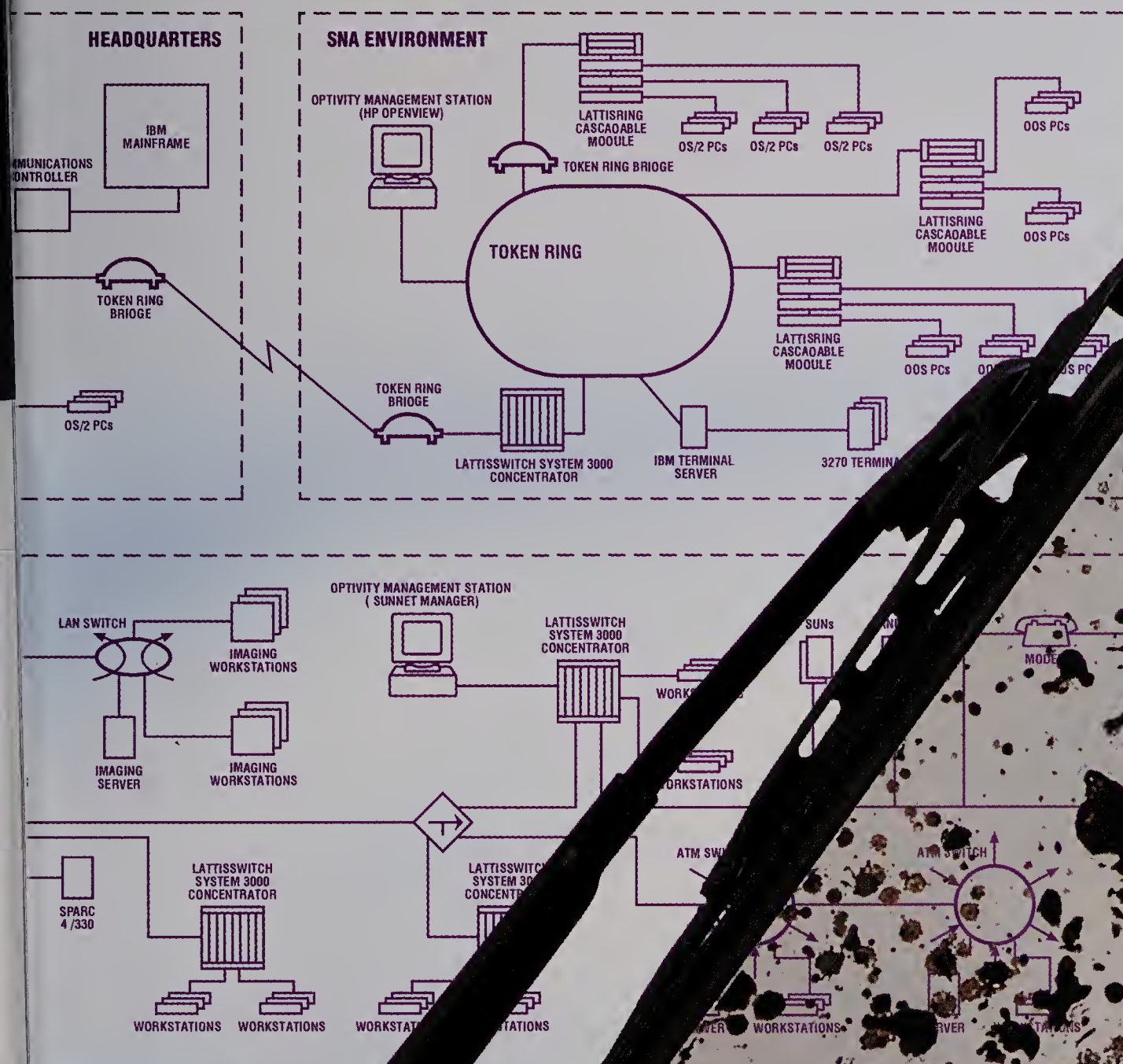
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Fortunately, she is taking notes on a pen-based computer. She enters his name and unobtrusively pushes a



button. The information is transmitted back to the mobile computer in the car, which runs the warrant check and signals her that she's talking to a wanted man.

This is just one of the applications that California's Orange County Sheriff's Department is discussing with PenUltimate Inc., a developer of pen- and mobile-computing software based in Irvine, Calif. The depart-

ment, a leader in high-tech law enforcement, recently completed a pilot of PenUltimate's C.O.P.S. (Computerized Officer Productivity System) software. Although the pilot was limited to the department's data-management and reporting procedures, the technology may eventually help officers solve crimes as well as fill out paperwork on them.

Currently, officers at a crime scene interview vic-

tims, witnesses and suspects and record all information on paper report forms. After being approved by a supervisor, the reports are submitted to office personnel who review them, determine statistical data, then keypunch the information into the office computer.

Using the new software, when a call comes in, the information is logged directly into the system for activity tracking and statistical analysis. Officers bring the handhelds along to crime scenes and enter corrections and additional information as they investigate.

To prepare for the pilot, PenUltimate representatives rode along in police cars to observe their subjects in the field. The officers spent up to an hour each day filling out activity reports on everything from car mileage to serial numbers on handcuffs to information on stolen goods and modus operandi. That time can be cut in half using C.O.P.S., the company estimates. And that in turn will increase the amount of time officers actually spend on patrol.

"We're surprised at the ease with which the deputies have mastered pen-based computing," says Lt. Joseph Davis, chief of police services for the City of Laguna Niguel, where the pilot is centered. Davis, who first became interested in pen technology while studying the future of voice recognition in police work, says his department is eagerly pursuing more-ambitious applications.

"All we were trying to do

DISK AT ELEVEN

Ever notice how rough late-breaking footage looks on the evening news?

There's always some cop trudging back and forth between reporter and camera, and local teens are making off-color gestures in the background. The problem is, lengthy tape-based editing methods don't leave enough time to edit and polish footage the station receives close to air time. But this constraint will become less prevalent as computer disk-based digital editing catches on in television newsrooms.

A few European news services have experimented with digital-editing technology from Avid Technology Inc. of Tewksbury, Mass. The BBC and Independent Television News of London

and Yleisradio of Finland praise the method's quickness, flexibility and the control it allows over late-breaking visuals.

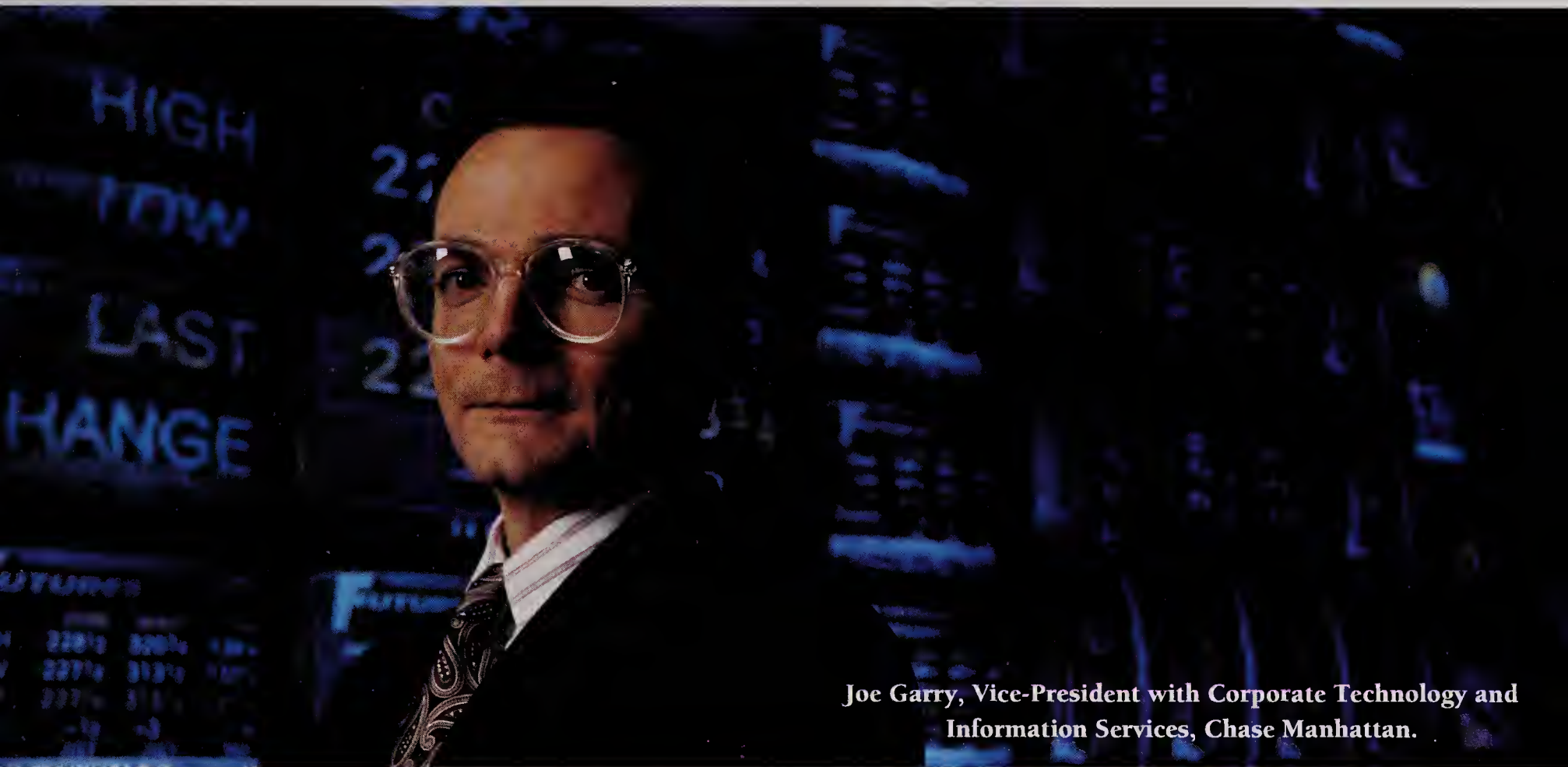
Broadcast engineers speaking at the 1993 International Television Symposium & Technical Exhibition in Switzerland said digital, disk-based production is going to be the future of the broadcast-news industry. Products like those from Avid can remove the limitations of tape-based news production, offering a seamless, all-digital workflow from recording through

editing and playback, including image tracking with a visual database.

It will also help remove obnoxious teenagers and other clutter from scenes of the crime. ■



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TRENDLINES



initially was put forms on a box," he says. "Now we're saying, 'where can we go with this technology?' to the point where we can have a totally centralized capture of data and make that information immediately available [at headquarters or] to other officers in the field. That could substantially speed up our response and our ability to identify crime patterns." ■

AN HMO THAT MAKES HOUSE CALLS

You've waited an hour for the doctor, and the pain in your side is beginning to push you over the edge. You flag a passing nurse, who apologizes and says the doctor is running late. "Oh, that's OK," you say weakly, as the nurse disappears into the employee lounge. What else *can* you say?

Comprecare, an Aurora,

Colo., health-maintenance organization, is encouraging its patients to say whatever they want—through a random telephone survey. A sampling of patients—about 20 per doctor per year—are contacted within 60 days of a visit to their primary-care physicians and asked questions relating to the length of wait, the atmosphere of the office, and the performance of the physician and other staff. Unsolicited comments are also noted.

Comprecare has recently improved this process by switching the data-management aspects, which had always been handled manually, to Andersen Consulting's Foundation for Cooperative Processing. The Windows-

based system consists of application-development tools, a client/server methodology and a message-based communications framework. The

software provides immediate tallying, so survey data is routed to the appropriate person within Comprecare the day after it is obtained, and problems can be addressed promptly.

At the end of the year, each physician is presented with an individualized performance report that is compared with the results of the whole group of physicians. And if getting your complaints off your chest isn't enough, you can take some satisfaction in the fact that 20 percent of your physician's annual bonus is tied directly to the surveys. ■

USER SUPPORT

AN INVENTIVE INCENTIVE

Call it green stamps for gearheads. But instead of helping them save up for that much-coveted chrome percolator, IBM Corp. has begun a program that allows PS/1 customers to swap online technical support for hard drives and new software.

The program is part of IBM's PS/1 Club, a support strategy focused on an electronic help module that is loaded onto every PS/1 sold. The company is aiming for an "out-of-box experience" that will gently introduce wary new owners to their PCs, says Tony Santelli,

ALL TOGETHER NOW

Hardware and service are a little like marriage and romance: It's preferable to get them both from the same source. At least that's the conclusion of a survey of 300 IS executives, in which 71 percent say that their primary hardware vendor is also their primary service provider.

According to the Business Research Group in Newton, Mass., respondents want one-stop support shopping that covers all of their systems rather than a mix of support services that can result in too many disclaimers of responsibility. In a typical configuration, a primary hardware supplier provides maintenance, installation, training, audits, consulting and disaster recovery. In every category reviewed, IBM was cited as "best provider."

The study estimates that users currently spend more than \$85 billion on IT service and support, and that by the turn of the century they will spend more than \$110 billion—about 25 percent of all IT spending. ■

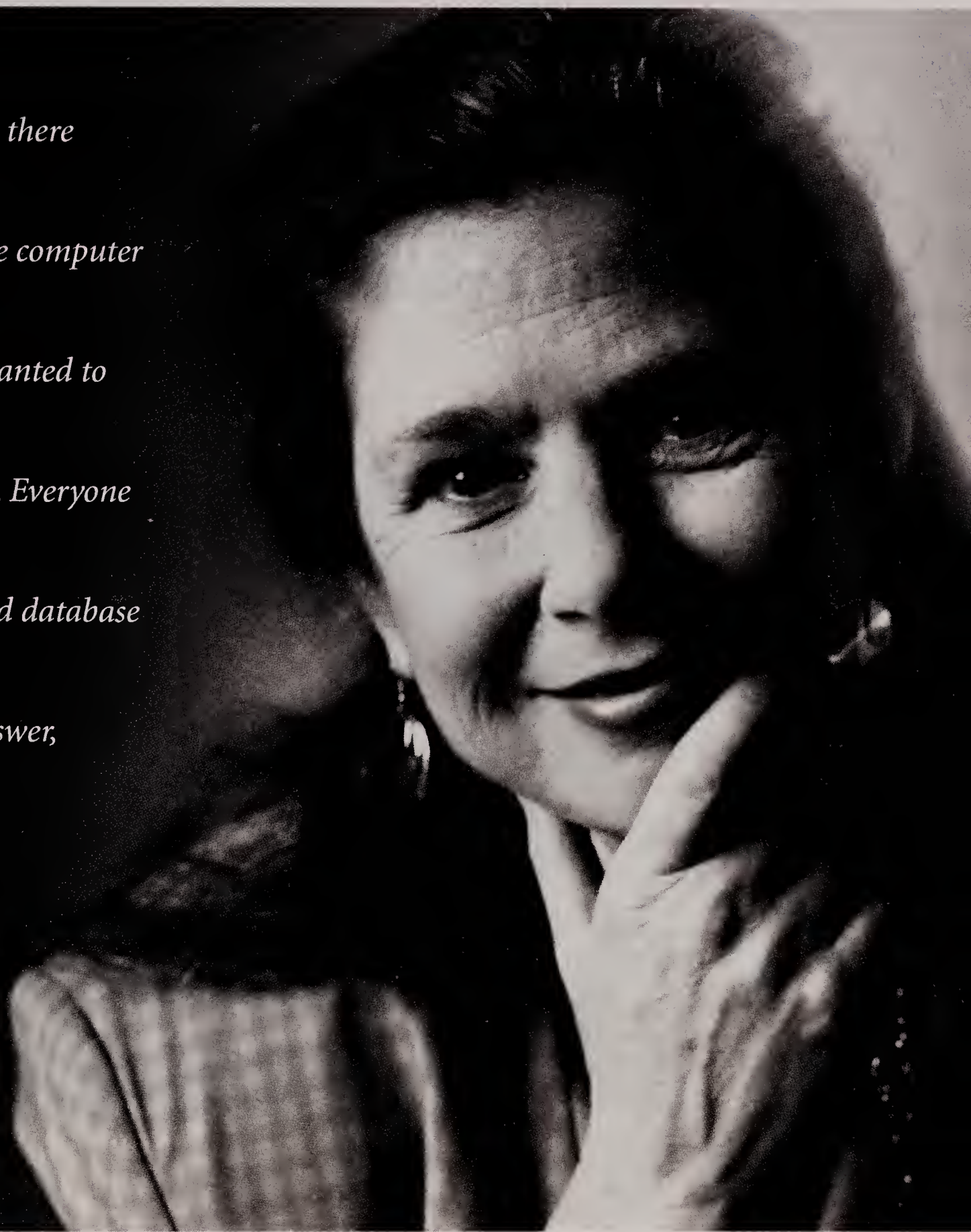
CAREER MOVES

The Electric Power Research Institute, the R&D arm of the U.S. electric-utility industry, has elected MARINA M. MANN to the position of vice president of information technology. She was previously director of the division.

LARRY RUNGE was appointed CIO of Wheels Inc., a vehicle-fleet management and leasing firm based in Des Plaines, Ill. Runge will be responsible for all areas of IT, including programming, data entry, computer operations and voice communications.

Wright Express Corp., a Portland, Me.-based provider of information-processing and -management services to commercial-vehicle fleets, has promoted CLYDE THOMAS to senior vice president and CIO. In addition to IS, print operations and distribution services, Thomas will be responsible for telecommunications, purchasing and facilities management. ■

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was more than one computer
on earth, people wanted to
share information. Everyone
thought distributed database
was the perfect answer,
the Holy Grail.
But guess what?
The reality is..."*



That's Berl Hartman, Vice President of Product Marketing. She's spent much of her career engineering and developing products that help customers get data into users' hands. In a remarkably candid conversation, she shares her experience and offers some valuable advice. For your own copy of the tape *"Distributing Data In The Client/Server Enterprise,"* call 1-800-SYBASE-1.

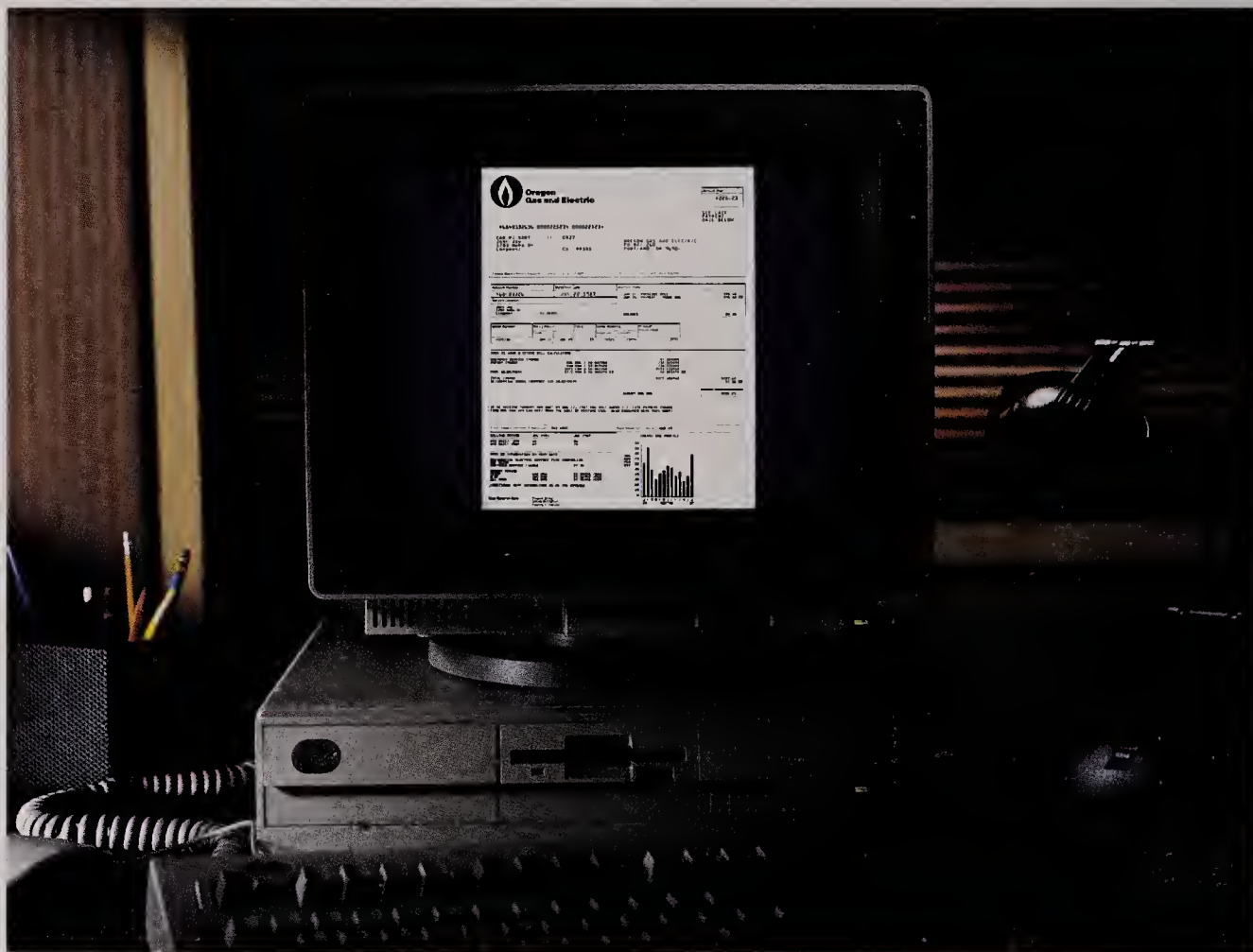
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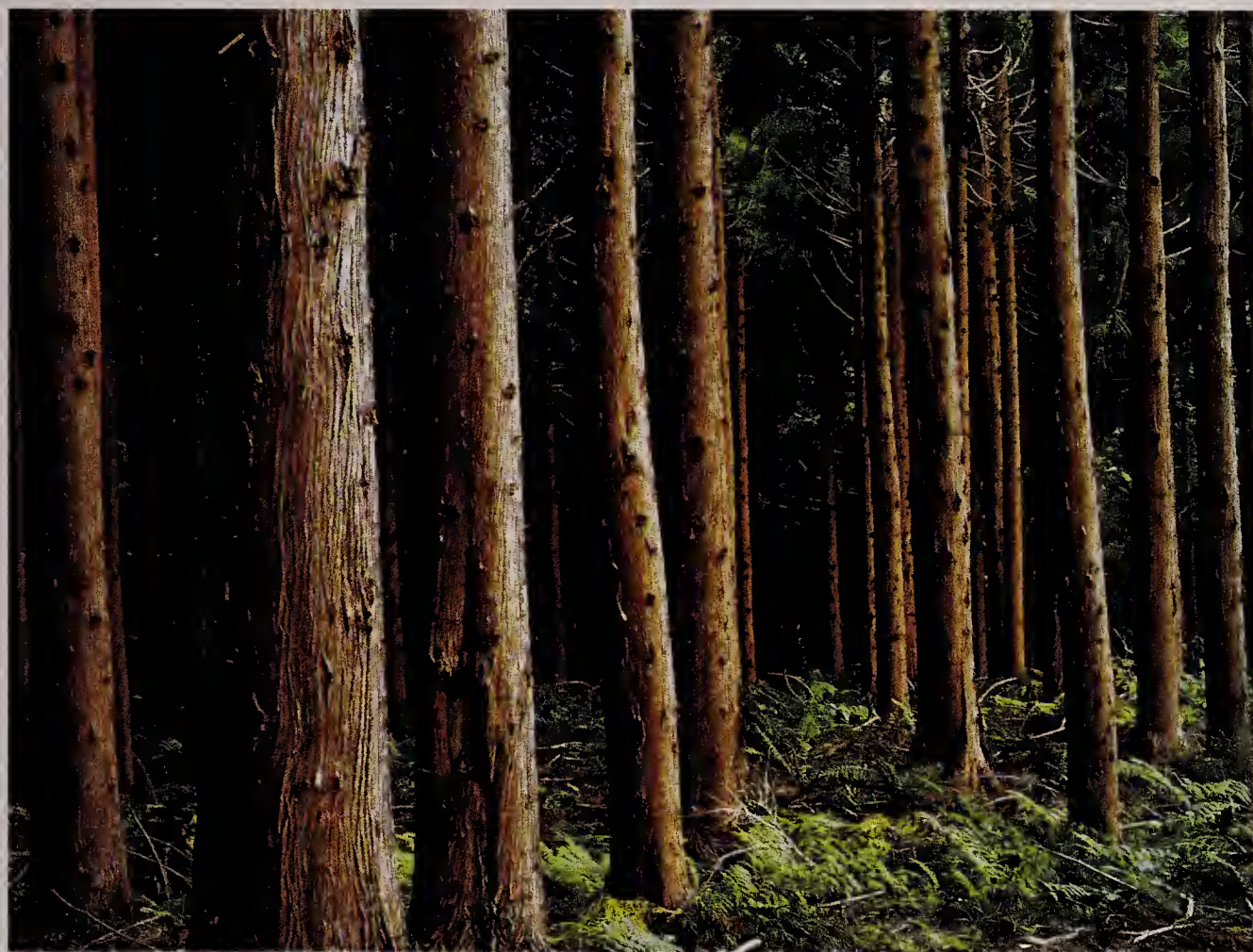
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TRENDLINES

president of IBM PC Co. products.

The help icon is the first thing owners see when they plug in their PCs. Clicking on the icon brings them into an online forum run through Prodigy, which includes a bulletin-board service on which users can post technical questions to IBM. When

Big Blue noticed that several PS/1 enthusiasts had taken to answering the questions, the idea for the Partners Club was born, Santelli says.

It works like this: Members collect frequent-flier-type points for each question they answer. They can then apply these points to gear upgrades—like more memo-

ry or a new hard drive. Santelli says the program is keeping support costs down for IBM. Small wonder—of the 50,000 or so questions that are posted online each month, 30 to 40 percent are fielded by fellow users.

On the corporate-colossus end of the support scale, the folks at Armonk have introduced Premium Partners, a new service that provides extra help for large clients with long-term desktop projects involving 1,000 or more PCs. Perks include designated tech-support people who know the details of customers' rollouts and can offer insider info on upcoming products—and even get IBM to modify products for them. Alan Langston, manager of the premium-brand desktop systems for IBM PC Co., says that the added support and early warnings about product introductions give customers time to decide whether to make the transition to a new-model PC or stick to their original plans.

One of the most important aspects of the program, Langston says, is IBM's ability to provide additional planning should the scope of a project change. "We believe the lynchpin of the program is transitional planning," he says. For more information, contact IBM at 800 772-2227. ■

GO SOUTH, YOUNG BUSINESS

The only thing finah than being in North Carolina is learning about it via an interactive computer program. That's the idea behind the Better Business Climate Electronic Brochure, the first such effort to promote a state's economic develop-



ment, according to North Carolina's Department of Commerce.

The department is distributing IBM PC-compatible disks (3.5- or 5.25-inch) to U.S. and foreign companies considering setting up shop, relocating or expanding operations in the Tar Heel State. The program, produced by multimedia marketer Einstein and Sandom Inc. in New York, uses full-color graphs, bar charts and graphics to educate potential investors about North Carolina's business climate, human resources and quality of life.

Probably the most useful information is contained in the brochure's comparative analyses. Users select from a long list of categories, including worker's compensation, construction, labor pool and recreational activities. The program then creates a colorful bar graph comparing North Carolina's offerings with those of other states.

Quality-of-life information describes the state's natural resources, cost-of-living, sports and leisure activities, and cultural institutions and events. And if trout fishing is your thing, you're all set. David Watkins, president of Keir Manufacturing, is quoted on the disk as saying he can leave his office and be at a trout stream in 10 minutes. Now, there's a neat way to spend your lunch hour. For more information, call 212 777-4350. ■

MONEY MATTERS

Large-company IS executives have good reason to bemoan the economic package that squeaked through Congress last August: Their impressive salary growth in the last decade has pushed them squarely into the ranks of rich Americans who will bear the greatest burden in tax increases.

Edward Perlin Associates Inc., a management-consulting firm in New York, recently released a survey on CIO salaries that includes data from 32 major corporations, many of them in the financial-services sector. The average total cash compensation for CIOs from these companies averaged \$407,400—up from \$159,000 in 1983.

The study showed that from 1983 to the present, total compensation for CIOs at these companies has grown at an average rate of 9.9 percent compounded annually, while base compensation grew an average of 7.1 percent per year.

Bonuses increased at an average of 14.5 percent per year; bonuses as a percentage of base compensation increased from 43.5 percent in 1983 to 84.4 percent in 1993. This shift of compensation toward bonuses is consistent with the trend toward increasing the variable component of compensation while slowing the growth of base pay, according to Perlin.

In addition, non-cash compensation such as stock options add an average \$150,000 to some of these CIOs' packages, bringing total average compensation to \$500,000 per year. ■





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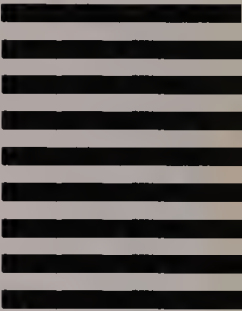
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TRENDLINES

LIFE IN THE FAST LANE

Technology is taking its toll on toll takers. The New York State Thruway Authority recently found its electronic toll-collection project temporarily blocked when the human-toll-collector's union complained that its members were in danger of being squished by cars zip-

ping past the booths without stopping.

A story in *The New York Times* said Teamsters Local 72 won an injunction against the Authority's E-ZPass system, which provides drivers with smart cards to mount inside their windshields. These vehicles can then pass through toll lanes without stopping; a computer reads the cards and makes

deductions from prepaid accounts.

The problem is that human toll collectors, who must still be on hand to service nonequipped vehicles, have to park on one side of the highway and then walk across the lanes to get to their booths, take breaks or help motorists in trouble. Cars using the system are supposed to slow down to 5 mph, but a spokesman for the authority admitted that most would probably go faster.

The union wants the Authority to install catwalks or tunnels to guarantee worker safety. Of course, some toll collectors may not have to worry about the dangers for long, considering that the



smart-card system is likely to reduce the need for human services. But that may not be the exact change they are looking for. ■

EVENTS

Computer Training & Support Conference

*Contemporary Resort,
Orlando, Fla.
Oct. 24-27
Ziff Institute
800 34-TRAIN*

Conference themes include technology in the workplace, total quality management and computer training in hands-on classrooms. Case studies of major corporations, training sessions, and a products-and-services expo will be featured. Registration fee: \$895

James Martin World Seminar and Software Reuse Engineering

*Biltmore Hotel, Los Angeles
Nov. 1-5
Buena Vista Place, Orlando, Fla.
Dec. 6-10
Extended Intelligence Inc.
312 346-5245*

The first three days, conducted by Martin, focus on redesigning business using TQM and new directions in IT. Carma McClure, a CASE authority, then explores reuse-based development and creating business applications. Registration fee: \$1,995

Develop Your CIO Leadership Skills in the Era of Healthcare Reform

*University of Michigan, Ann Arbor, Mich.
Nov. 15-19
CHIME
313 665-0000*

IT executives, non-IT management and professors in the health-care-information field discuss how to deal effectively with health-care reform and use effective management skills while capitalizing on the benefits of IT. Registration fee: \$1,600

Reengineering Customer Service & Technical Support

*San Francisco Hilton, San Francisco
Dec. 6&7
International Quality & Productivity Center
800 882-8684*

Successful tactics, case studies and examples from experienced business leaders describing how they improved speed, efficiency and quality through reengineering. Presenters include Bank of America, Pacific Bell, AT&T, Ernst & Young and Hewlett-Packard. Registration fee: \$1,095

IT'S A SMALL WORLD AFTER ALL

Sprint Corp. and Microelectronics and Computer Technology Corp. (MCC), an IT-research consortium, have formed an alliance that will allow manufacturing, financial, health-care, retail and other industries to conduct business electronically with their suppliers and development partners worldwide.

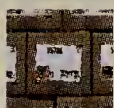
The alliance will pair MCC's Enterprise Integration Network (EINet) with Sprint's data-transport products. EINet provides a set of advanced network services that link networks and industry-specific applications. These services ensure secure transactions, provide the navigation tools to locate information and services online, and support multimedia electronic messaging.

The combined Sprint and EINet capabilities will provide the connectivity, tools and services necessary to seamlessly interconnect businesses for broad-based electronic commerce on any of the more-than-11,000 networks connected to the Internet.

The alliance will support such business processes as agile manufacturing and concurrent engineering. For example, a purchasing agent for a manufacturer could look up parts through an electronic catalog of suppliers worldwide, view items for purchase via an electronically submitted photograph or video, and order and pay for the parts online. ■



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*Frank T. Giannattasio, VP Operations
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Taking New Measures

IS departments that want to improve performance should stop naval-gazing and start considering how they measure up against other companies—and in the eyes of their customers

BY CHANDRAN SANKARAN AND
HENRY D. TAYLOR JR.

In an environment of belt-tightening and overhead cost-cutting, all corporate services are under pressure to add value to their companies. Corporate IS and telecommunications functions—with budgets as high as \$500 million in a typical Fortune 100 company, or 5 percent of annual revenues—are at the center of the storm. Corporate leaders clamor for simple ways to measure the effectiveness of these functions and to run them more like businesses—with an eye to the bottom line.

At the heart of the problem is a simple reality—IS organizations don't have a real bottom line. Market-driven businesses offer services that are competitively valued by their customers; this value is reflected in the price paid for those services. IS organizations don't have this link with the marketplace. Competitive businesses can tell that their costs are too high when profits go down. IS organizations lack this capability as well.

Two broad initiatives can help create these vital financial bearings in IS organizations, strengthening the CIO's intuition about market value and costs and helping to illuminate

the elusive IS bottom line. One is to establish customer-based measures of service performance. The other is to benchmark cost and productivity levels against other companies.

Customer-based measures

Users no longer feel tied to buying corporate services—they can develop most by themselves in-house or choose among numerous third-party providers at attractive prices. With this vigorous free market flourishing outside its walls, IS must give customers a greater voice in shaping and controlling IS services. This will ensure greater value for the businesses and force IS to increase productivity and effectiveness.

How does the CIO give customers this voice? Managers of central IS functions worry that giving users too much control will create a standards and architecture nightmare. Free marketers, however, say this argument is just an excuse to avoid market tests.

One way IS can connect with its market, without giving up control of central systems and networks, is to evaluate its performance from the customer's perspective. Consider a sales rep trying to clinch a sale at the customer site and being unable to access a company product-pricing database. To that sales representative, it matters very little whether the problem lies in his laptop, a failed line somewhere in the sierra or the fact that he dialed the wrong telephone number. The sale may fail because the supporting IS services have failed.

If the collective experience of users is similarly negative, then IS should consider itself ineffective, regardless of the sophistication of the technology infrastructure. CIOs should listen to their customers' assessments rather than rely on internal measures of in-

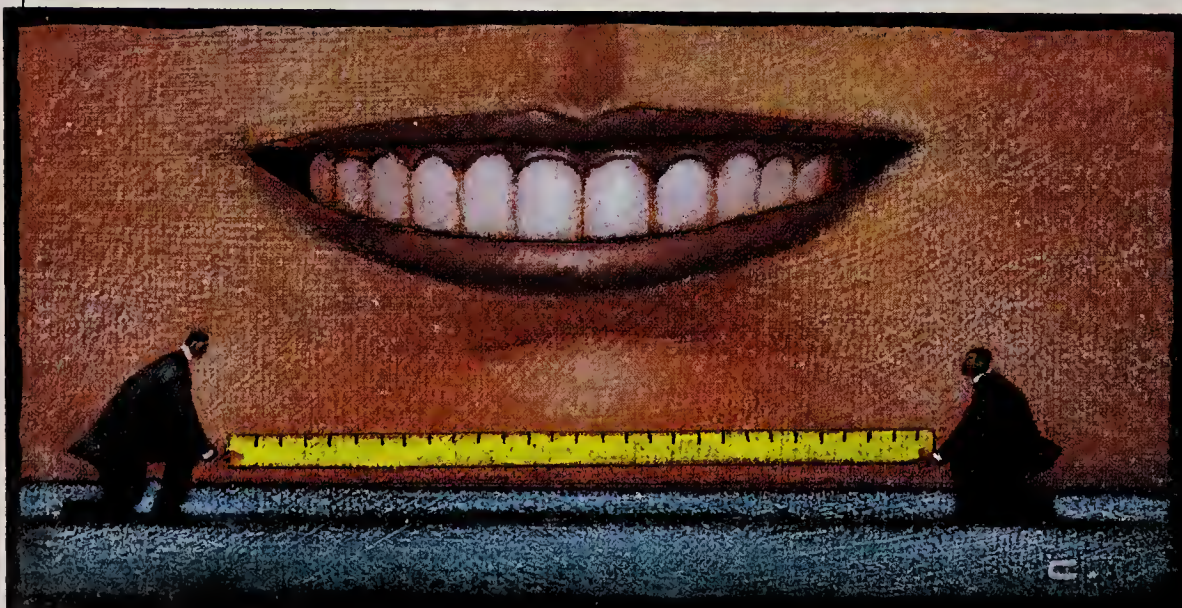


ILLUSTRATION BY DAVE CUTLER

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frastructure performance. This approach provides several benefits. First, it allows the CIO to cut through seductive technical arguments. No longer can operating investments be justified on the basis of improving up-time from 97 to 99 percent, when this adds nothing from the customer's perspective.

Second, understanding customer perceptions makes it easier for managers to articulate the rationale for "intangible" investments that create high user value—such as redundant network routes that allow calls to remain connected even when one line goes down.

Finally, customer-based measures make it possible for the CIO to ferret out otherwise hidden dependencies in service delivery. Often an IS service is delivered as a partnership among central IS, business users and local support groups. When the user's view of the service is measured, the entire delivery chain is evaluated and weak links become visible.

It's not easy, however, to translate the customer's perspective into a quantitative, actionable measurement that can be used as an effective management tool. The key is to avoid creating new processes and instead design measures around existing vehicles for customer interaction. One such vehicle is the help desk.

The IS help desk is analogous to a telephone product-support line—with one big difference. Real businesses have other mechanisms to take the pulse of their marketplace—sales-rep contact with customers, changes in sales-booking figures, contact with reseller channels—but corporate IS functions do not. Although the help desk is often the only major artery of direct customer interaction available to IS, it is usually relegated to a minor, operations-support role. Raising the help desk's visibility can help IS connect with its marketplace on a day-to-day operational basis.

For the help desk to become a credible source of customer information, the CIO must ensure that it is well-publicized among users and that a high, uniform level of respon-

siveness is maintained. Otherwise, it will be difficult to gauge whether the lack of calls is an accurate reflection of user experiences or merely a reflection of users' perceptions of the help desk itself.

One effective way of exploiting the help desk is to create a monthly "trouble index" for each service. At

Meaningful benchmarking requires a deep understanding of the drivers of IS strategy and costs in each company.

the end of each month, the index counts the number of "troubles" called in for a particular service, perhaps giving additional weight to problems that the customer considers most severe.

Hewlett-Packard Co. tracked troubles with the company's Batchnet network, which allows distributed-application systems to share data files. Soon after the measure was instituted, the Batchnet service team began thinking of ways to improve the network's performance. An analysis of the index by geography and type of complaint allowed the team to isolate a few defective software modules. The team also discovered that system operators in the smaller H-P sites, on whom fewer demands were made, needed more-frequent training to administer the network service efficiently. These diagnoses allowed the team to make significant improvements in service.

A measurement device like the trouble index is easy to generate, interpret and act upon. By analyzing the data in a systematic manner, even without a detailed understanding of the underlying technology, a business manager or CIO can guide technical specialists toward solutions and improve service in a manner that has direct user impact.

Perhaps the greatest benefit of the

trouble index to H-P is the sense of ownership and self-determination that it has created among IS service managers. The measure's simplicity and clear customer connection enable front-line IS employees to put together market-centered business plans for their services rather than technology-centered operating plans. They can also better understand and manage the complex partnerships involved in delivering services to end customers.

Benchmarking measures

If delivering effective services is half the CIO's job, doing it cheaply is the other half. In most large companies, the funds available for IT investments are rapidly diminishing, and IS organizations are being required to explicitly demonstrate their productivity.

Benchmarking can be a powerful tool in managing this pressure. The idea is to measure how the productivity of the IS organization compares with that of similar ones. The premise is that an IS organization that demonstrates more mileage per dollar stands a better chance of selling its users on the value of its services and persuading senior management to back further investment. However, stories of successful IS benchmarking are rare. What goes wrong?

Differences among IS organizations are the first problem. The role and strategic importance of IS services in a money-center bank with several thousand ATMs, for instance, differs fundamentally from the role of IS services supporting R&D and product development in a large high-tech company. Even two high-tech manufacturing companies can differ substantially. Meaningful benchmarking requires a deep understanding of the drivers of IS strategy and costs in each company.

Adding to the complexity, each company defines IS costs differently. Some include telecommunications services; others don't. Some have access to worldwide costs, others only to domestic costs. Some have access only to costs provided by cen-

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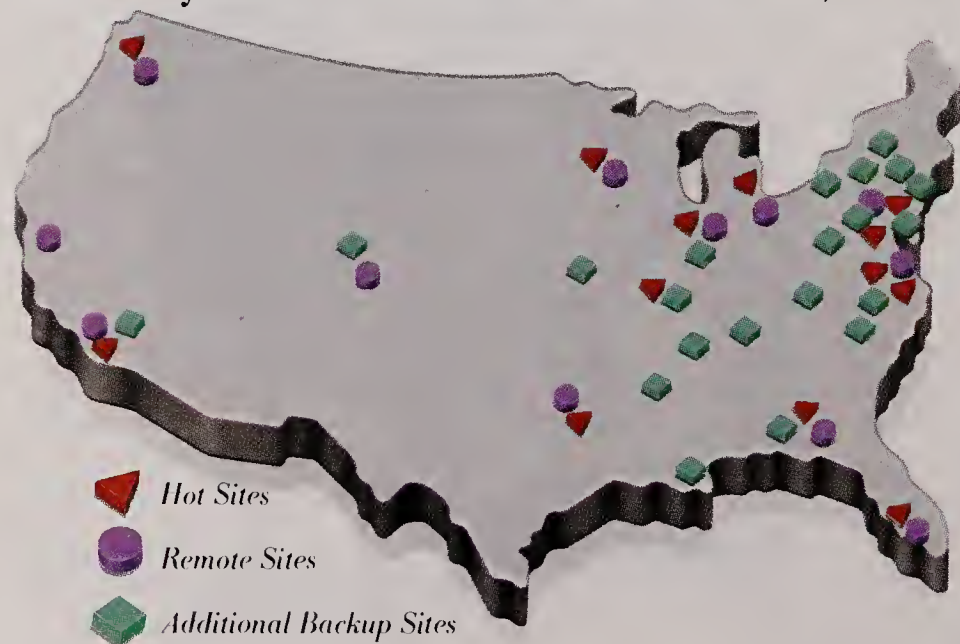
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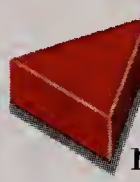
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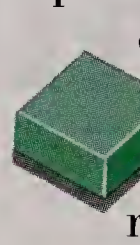


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tral accounting systems; others have their own internal cost-tracking and -reporting mechanisms.

For these reasons, a simple, high-level data exchange between companies or a subscription to an anonymous industry database compiled by a consultant will usually not work. The key is to pay at least as much attention to the process of benchmarking as to the data itself.

Begin by selecting partners with an intense desire to understand their own performance. All the companies should be willing to commit high-level management to the process and to make every effort to collect the benchmark data defined by the group. Partner companies should meet as a group; the first meeting should establish rules and develop detailed definitions of the data each company will collect. A second meeting to perform comparisons should be scheduled after allowing sufficient time (perhaps three months) for data collection.

The companies should take a broad view of the IS function, collecting cost information on worldwide IS organizations, organizations not directly controlled by the corporate center, and applications, networks, local-site support staff and external payments for services purchased. Since dissimilar accounting methodologies frequently cause the benchmarking process to fail, definitions of IS costs should transcend existing accounting constraints.

Taking this broad view is important because managing down only some visible costs may create large costs elsewhere in the organization. For example, the CIO could make a corporate budgetary decision not to support large centralized servers, thereby forcing the purchase of several hundred PCs in remote organizations.

Usage patterns and organizational structure are important drivers of IT productivity. When collecting usage data (traffic and volume), only traffic generated by end users should be considered because system-to-system traffic is highly dependent on geographic constraints and specific

architectural choices. Key measures of each company's geographic spread and degree of IS centralization help explain differences in costs.

Participating companies should gather whatever data is available through central accounting systems and supplement it with cost surveys of divisions or regions. Estimated complete data is considerably more valuable to the benchmarking process than precise incomplete data. Often, this will be the first opportunity each company has to view its entire IS cost base systematically.

Each company should discuss its view and interpretation of the data, with an open discussion of its strategies and the structural constraints that it believes are driving the numbers. The discussion environment should be non-judgmental and should facilitate each partner learning from the comparisons.

When H-P went into a benchmarking program for its telecommunica-

ful overhead, but by extraordinarily high consumption. The first step toward reducing costs was to develop tools to track traffic generated by each site and to form focus groups to help understand how services were used. At one site, it was discovered, just 2 percent of the user population of a network service generated more than 80 percent of the total traffic, apparently because they were providing a multisite engineering service.

H-P also discovered that it had a considerably more-decentralized telecom structure than the others in the group. At the time, less than 20 percent of H-P's worldwide staff involved in supporting telecom services reported directly into the central telecom organization. As a result, H-P could not adequately share skills and resources, fund telecom-line investments with a global perspective or control expenditures; this led to lower productivity overall. In response, H-P started offering centralized services that facilitated a major reorganization and consolidation of telecom and led to reductions in worldwide costs.

Where a market-driven organization can measure the value customers place on its services through the price they are willing to pay, an IS organization must explicitly measure customer perception of its services. Instituting customer-based measures and productivity benchmarking are the first steps toward creating a culture where problems are defined and solved in business terms—and an organization that is customer-driven and financially responsible. These tools can help create change in the IS organization and then—like all useful tools—make themselves obsolete by helping the organization grow beyond the need for such simple devices. ☐

Where a market-driven organization can measure the value customers place on its services through the price they are willing to pay, an IS organization must explicitly measure customer perception of its services.

tions function, the company found that it spent more on telecom than any of its partners, both in absolute terms and as a percentage of company revenues. Naturally, this was a cause for concern and seemed to confirm the perception that costs at H-P were excessive. However, without understanding what was driving these costs, launching a cost-cutting program would have been wrong.

A quick examination of the comparative-usage levels revealed that these costs were driven not by waste-

Chandran Sankaran is a consultant in the San Francisco office of management-consulting firm McKinsey & Co. Inc. Henry D. Taylor is manager of Hewlett-Packard Co.'s corporate networking services department in Palo Alto, Calif.

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A Better Understanding

There are faults on both sides of the long-standing gap between CEOs and CIOs. But IS executives can bridge that divide by adopting a service orientation—and win a place at the strategy-setting table into the bargain

BY DANIEL L. BARTH

The uneasy alliance that has traditionally characterized the relationship between CIOs and CEOs is becoming stronger. This encouraging development comes as a number of business and technology trends converge, creating a new spirit of cooperation between executive management and the information systems organization.

For too long, a gulf has existed between chief executives and their technical staffs. Many CEOs have been consistently disappointed by the deadlines missed, budgets exceeded and opportunities blown by their companies' IS organizations. They have been further frustrated by the inability of their CIOs to address strategic technical issues in financial, quantifiable business terms. Over the years, unfortunately, the objectives of IS professionals have not always been aligned with those of the business. The glowing promises of information technology have not been realized because of this fundamental disconnect.

In fairness, many CEOs accept some responsibility for perpetuating this problem. They admit that the

objectives of the business have not always been carefully communicated. In formulating enterprisewide strategies, many chief executives have neglected to consult their IS staffs.

Because any division between an enterprise's executive and technical staffs is costly, many CIOs and CEOs have taken positive steps to improve their communication—and consequently their potential for a productive partnership. A noteworthy example of this kind of cooperation was a recent CEO retreat in which I participated as a representative of CIOs.

Called "The CEO in a Wired World," this three-day event served as a kind of technology boot camp where CEOs could gain hands-on experience with the latest in hardware, software and connectivity technology. Sponsored by Computer Associates International Inc. and organized by The CEO Institutes (a division of International Media Partners in New York), the retreat aimed at empowering chief executives to face the challenges of doing business in the networked, global economy.

The CEOs—a third of whom represented international companies—were in general agreement on the steps that must be taken to eliminate miscommunication between themselves and their top IS officers. From the panel sessions, it quickly became evident that both sides have contributed to the problem. In many cases, CEOs have been unwilling to acknowledge the changing role of CIOs. For their part, CIOs admitted that they have not developed the business acumen required to participate in the board room—and have therefore not proved themselves to be worthy business partners.

But while a panel of CIOs admitted to some failures on the part of IS,

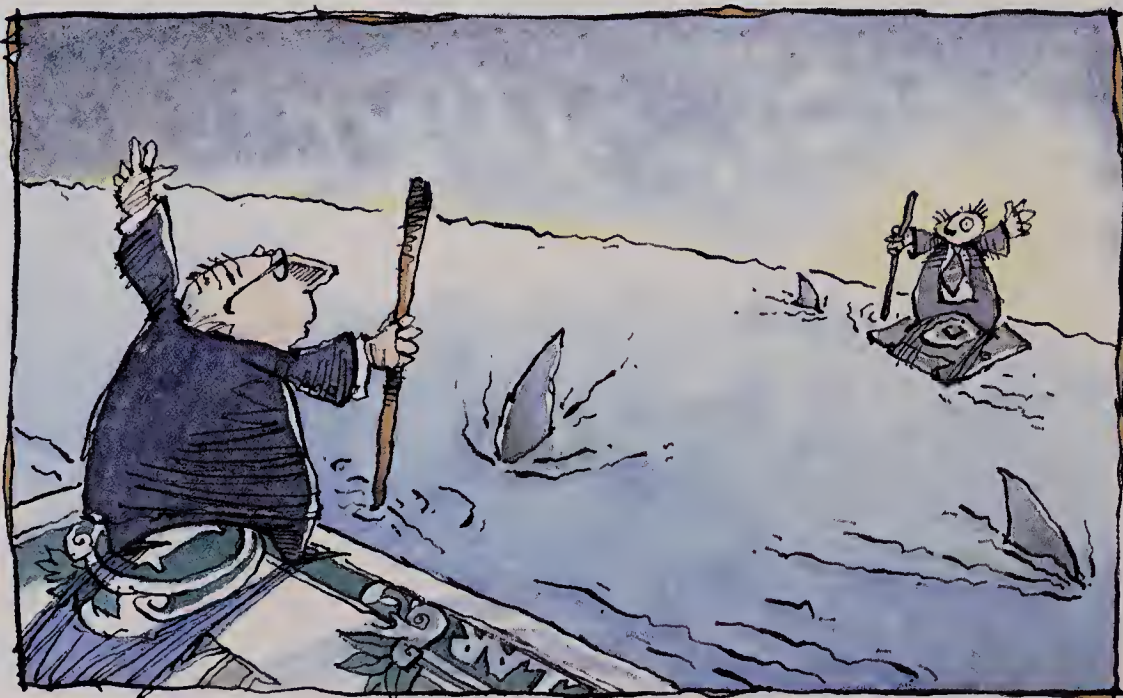


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A black and white photograph of a woman with dark hair, wearing a patterned sweater, laughing heartily while holding a telephone receiver to her mouth. The background is dark and out of focus.

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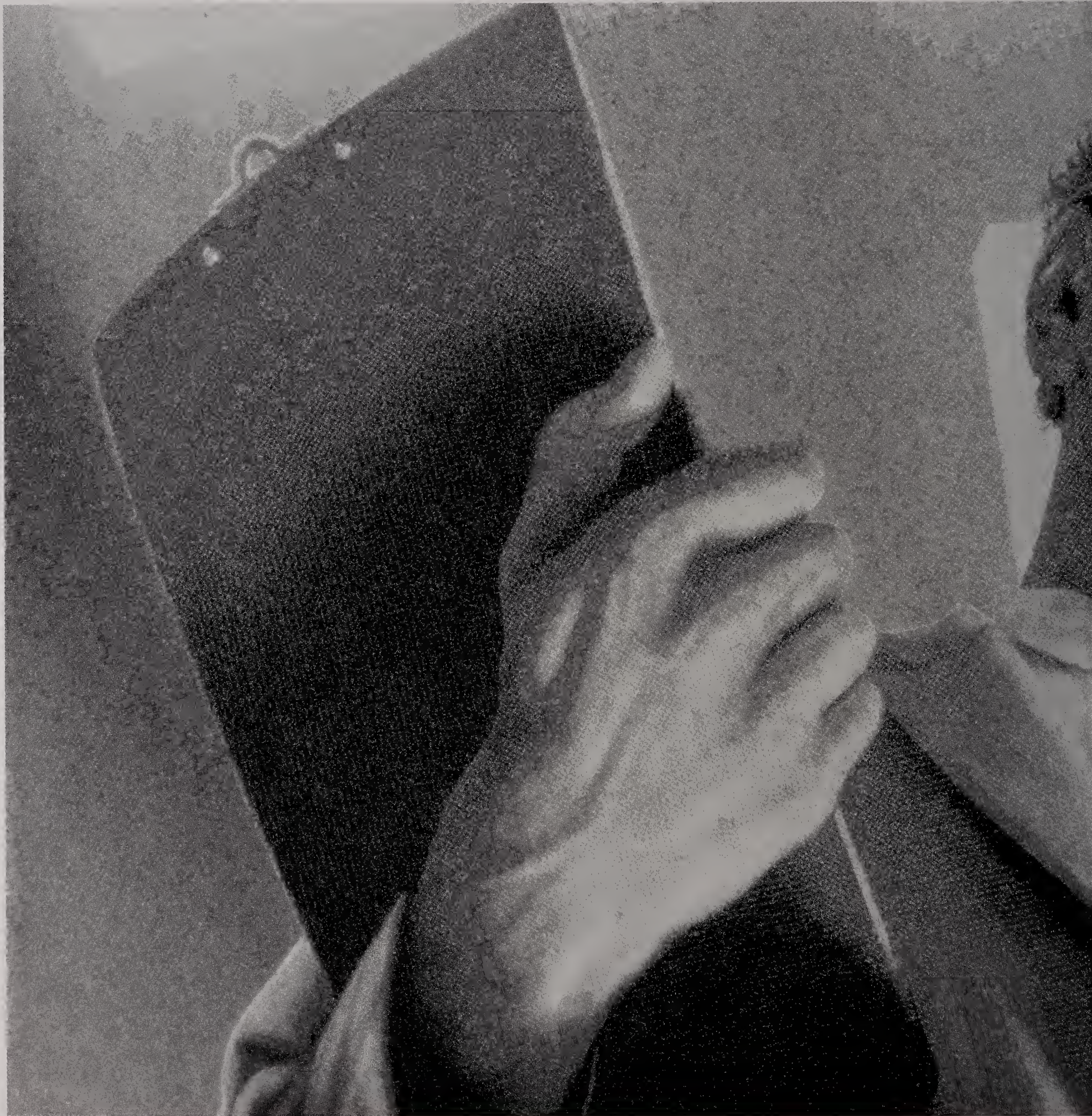
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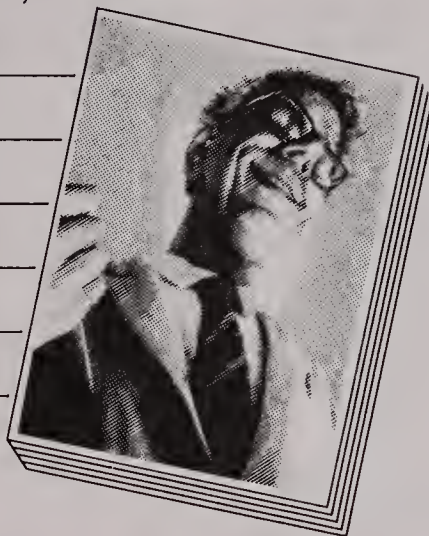
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they reminded the chief executives that the fault was not all on their side—in language the CEOs were not likely to hear from their own IS staffs. While acknowledging IS's problems, the CIOs pleaded for an enlightened attitude on the part of CEOs toward technology and for greater IS participation in strategic planning.

CIOs need to be in the strategic-planning loop if they are to make technology decisions that are consistently aligned with the corporation's goals, the panelists said. It is only with the insight that comes from participation in such meetings that CIOs can develop technology solutions that best serve the corporate plans.

Many of the suggestions raised at the CEO retreat have already become common practice at ClubCorp Systems, the IS division of ClubCorp International, which owns and manages private clubs and resorts around the world. We have visibly improved our credibility among the company's senior executives by establishing a strong service attitude toward the company; aligning ourselves with the customers and becoming more of a team player when working with other units of the enterprise, and transforming IT-development methodologies to give customers what they want more quickly.

ClubCorp Systems firmly believes that IS exists to support the business, enable growth and help the company discover new opportunities for increased efficiency, productivity and profitability. We believe the mission of IS is to provide solutions to the business rather than reasons why initiatives are not feasible. IS must give customers what they need, not what we believe they need. Our goal should be to respond to customers' requests with choices instead of restrictions. At ClubCorp Systems, this progressive attitude has given our customers greater control over their choice of IS services. But it is an attitude that does not come easily to some IS staffs.

Any attitude shift requires a major philosophical reorientation. For example, we coach IS staff to look for

and offer alternatives instead of focusing on limitations. In many cases, offering alternatives requires more effort than imposing constraints. Consequently, we offer recognition and rewards to IS staff members who successfully align themselves with the new focus on service and solutions.

To formalize the evolving role of IS at ClubCorp, the company split off the IS function into a separate division. Working as a discrete organization not only helps us focus on our

CIOs need to be in the strategic-planning loop if they are to make decisions that are consistently aligned with the corporation's goals.

mission; it also brings home the fact that if we can't deliver, there are dozens of outsourcing and facilities-management concerns out there ready to try. The company deserves the most cost-effective and productive IS services available. If an outside firm can deliver such services more efficiently and effectively than we can, then ClubCorp should take advantage of the opportunity.

The old paradigm of a reactive IS waiting for customer requests must yield to a new attitude of involvement and teamwork. At ClubCorp Systems, we get involved in customer applications from the earliest stages. No longer are we satisfied with requirements framed by people who don't work in the environments the systems will support. Instead, we visit user sites to observe their requirements for ourselves.

Moreover, each project is owned by the customer group, with IS acting as technical partner and consultant to the group. This joint effort has helped secure funding and win senior executives' support, as well as streamline the delivery schedule and improve quality. Another benefit: IS and the business units better understand

each others' limitations.

Good enough just isn't good enough anymore. Once-sufficient development methodologies cannot respond with adequate speed to rapidly emerging business requirements. Applications being integrated into the operations of our clubs require that we respond much faster than when we were simply creating accounting and back-office systems.

In response, we implemented a rapid application-development (RAD) process that delivers projects in time frames measured in weeks rather than months or years. We then leveraged each success into larger and more-beneficial achievements, so now IS has a position of unprecedented credibility and worth.

To support the RAD process, we had to abandon traditional approaches in favor of new iterative tools and techniques. We chose an object-development process that allows us to quickly prototype the company's business processes, both as they are and as users want them to be. Changes can be made on the spot instead of in six months.

Within six weeks, users have a workable system while, behind the scenes, IS finishes up details such as application logic, error-handling and online help. If we do not have the basic processes of a new application up and running in six weeks, we review the project's scope and how decisions were made during development.

Thanks to a series of successes over the past three years, IS has earned the right to participate in the strategic business decisions of the company. Our senior executives were initially amazed by the quick turnaround and high quality this participation has enabled. These successes have made a big difference in their attitudes toward IS. Senior executives now recognize that IT can help them realize their dreams. When it takes two years to execute a project, those dreams are merely fantasies. ☐

Daniel L. Barth is senior vice president of ClubCorp Systems, the IS division of ClubCorp International, in Dallas.

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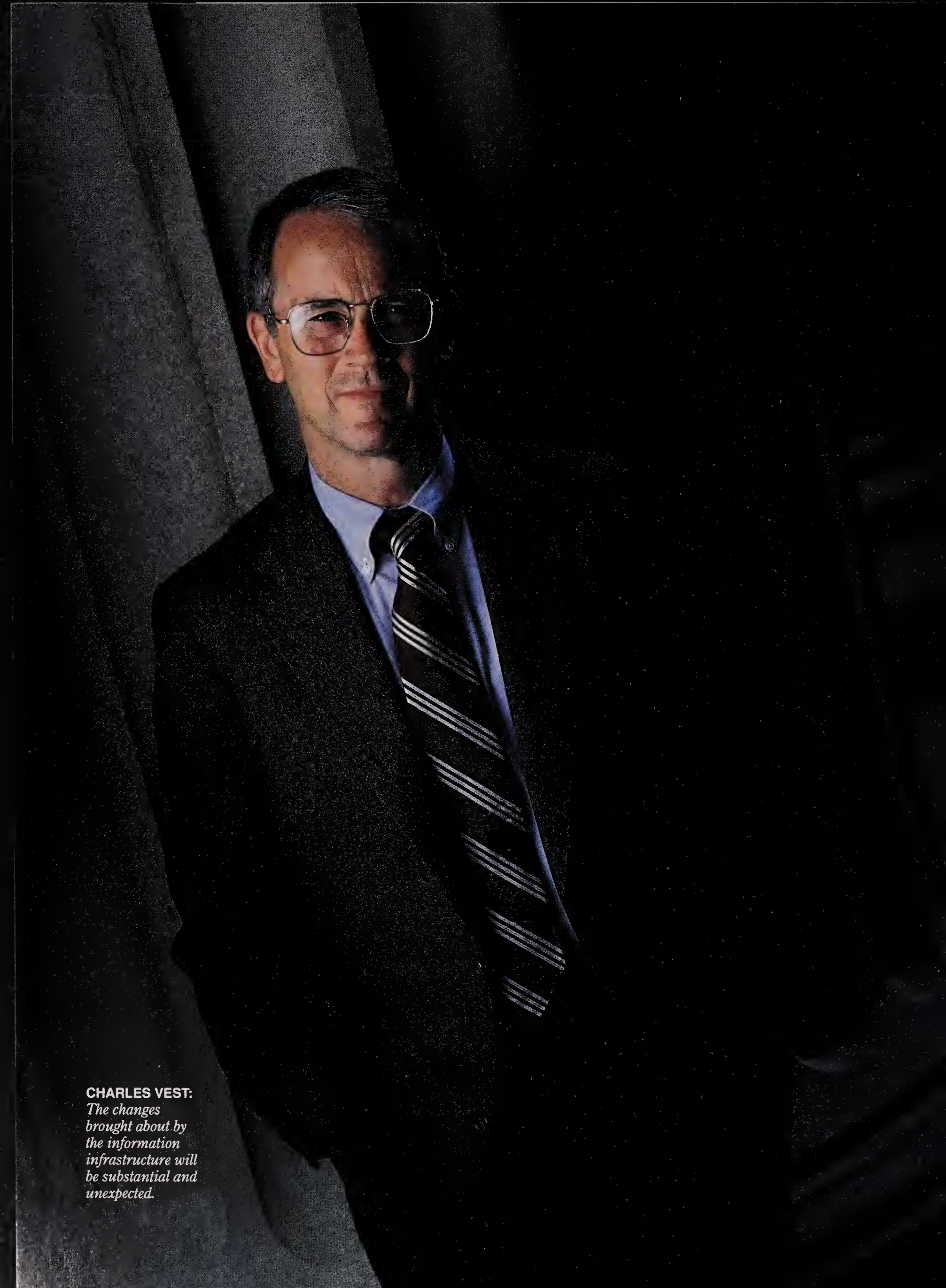
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A black and white portrait of Charles Vest, a middle-aged man with glasses, wearing a dark suit, light blue shirt, and a striped tie. He is standing against a dark, textured background with a diagonal light source creating a strong shadow on his left side. The image has a grainy, high-contrast aesthetic.

CHARLES VEST:
*The changes
brought about by
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infrastructure will
be substantial and
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INFORMATION *and* ACCESS *for* ALL

The national information infrastructure will have a profound effect on the way companies operate, our nation's competitiveness and our very social structure.

MIT President Charles M. Vest, co-chairman of the 21st Century Information Infrastructure Project, explains why.

BY LEIGH BUCHANAN

S EXECUTIVES are frequently urged to keep their eyes on the big picture, and no picture is bigger than the nation's information infrastructure. When fully deployed in the next decade or so, the advanced infrastructure (one of the flashiest planks in candidate Clinton's campaign platform) will allow all Americans to access information and communicate easily, securely and cost-effectively in data, image or video.

Such projects will be an important determinant in the competitive advantage of nations battling for position in the global marketplace, according to the Council on Competitiveness, a private, non-profit coalition of chief executives, based in Washington. Experts in the public and private sectors expect the advanced infrastructure to create new jobs, drive economic growth and provide the backbone for sophisticated training systems.

In addition, it is supposed to enhance the quality of life for all citizens by improving social services, education and entertainment.

Other countries, notably Japan, Germany, Singapore and France, are embarking on similar projects, making rapid deployment even more vital to this country's competitive interests, the Council says. But speed bumps exist, embodied in issues of standards, security, access and the traditional lack of cooperation among competing companies and industries—and between industry and government. Some of these difficulties are already giving way: Leading cable and computer companies, long-distance carriers, cellular firms and other private-sector organizations recently pledged their support to expediting the infrastructure's deployment.

MIT President Charles M. Vest is the co-chairman (with former Hewlett-Packard Co. CEO and Pres-

ident John Young) of the Council's 21st Century Information Infrastructure Project. He spoke with *CIO* Associate Editor Leigh Buchanan about what the infrastructure will mean for U.S. industry and how IS executives can prepare their organizations for its arrival.

CIO: *Which industries will be the most immediately and dramatically affected by the implementation of the information infrastructure?*

VEST: It is very difficult to predict which industries will benefit the most. There will be some obvious ones, such as health care, and I think we'll see smaller-scale manufacturing industries grouping and working together across geographical boundaries in new ways. But it's the uncertainty of it all and the flexibility that I find exciting. If I may draw an analogy to education: Educational computing experiments were introduced largely by engineering schools, but a few years later, you find that many of the most exciting applications have ended up being in music, theater and liberal arts. I expect the same thing to follow in industry as the impact of the infrastructure is felt in areas that would not have seemed obvious at first.

CIO: *What are the technologies, or the characteristics of the technologies, that will be at the forefront of the information-integrated society?*

VEST: The most important characteristic of emerging technologies will be accessibility—that is what will determine, in my mind, what succeeds and what fails. Where would you place your bets? It's hard to say. Certainly on the set of so-called coordination technologies that enable people, with computer mediation, to work together across temporal and geographic boundaries.

I think we'll see an increased use of technologies that allow telepresence of one sort or another in conferencing and manufacturing applications, and certainly the emergence of "know-bots" and related technologies. [Vest defines know-bots as

**"THE REAL CHALLENGE
FOR this public/private
mixture of investment
and activity will be to
keep it moving in the
national interest—that
should be the guiding
principle."**

"software entities that you can think of as roaming the networks looking for information from a variety of sources and then gathering and massaging that information into a usable form." Whether these things will come about through copper wire, fiber optics, cable, wireless, digital, who knows?

CIO: *What will be the information infrastructure's most important effect on the way companies function competitively and cooperatively?*

VEST: One of the primary results of a successful information infrastructure is that talents, expertise, specialized equipment and knowledge that exist in different places within a large organization—or in different organizations across the country or around the world—will be quickly assembled and integrated to perform a task. You'll be able to pull companies and organizations together very rapidly, for example, to manufacture and market a new product by drawing on talents that don't exist in a single company. The potential for health-care applications, in particular, is just tremendous. We'll be supplying expertise to remote locations—setting uniform standards so that technologies that produce images, such as magnetic resonance imaging, can be used uniformly around the world for diagnostic purposes.

In the meantime, there are a lot of legal and regulatory issues that will have to be resolved. But I think that, ultimately, where there's a will and the technology, there will be a way.

CIO: *The development of the infrastructure is described as a public/private partnership. How do you envision the role of both players?*

VEST: The role of the private sector is the really interesting aspect in the creation of America's infrastructure as opposed to most of the other developing systems around the world. In France and Singapore, for example, these systems are largely centrally organized and government-oriented. What's exciting about this country is how we can mold our traditional entrepreneurial private-enterprise system to create what we on the Council envision not as a single network but as a network of networks. In this country, you won't know in advance just who the winners and losers will be technologically or organizationally, because the information infrastructure is, and will continue to be, driven by the private sector.

Our government will have to do two things. First, it's going to have to work in concert with private industry to adjust the regulatory environment to allow the levels of cooperation as well as competition that will be needed. Second, I believe there will continue to be a need for the federal government to fund some of the larger-scale, longer-range research. It's a role that DARPA [the Pentagon's Defense Advanced Research Projects Agency] played in the development of high-performance computing over the years.

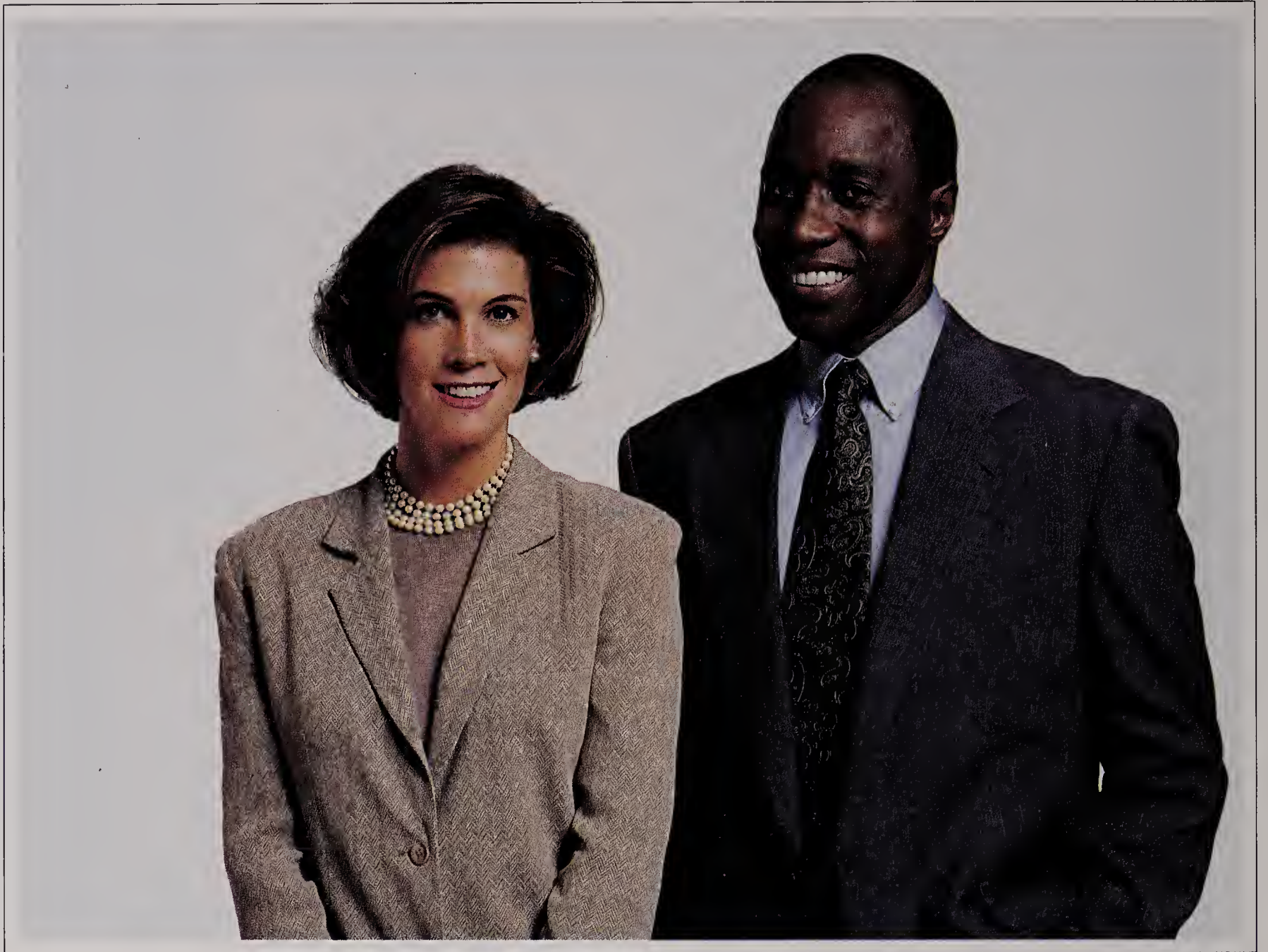
CIO: *With a variety of private-sector organizations, such as cable companies and long-distance carriers, working together, what should be the guiding principle in resolving conflicts caused by divergent interests?*

VEST: I think the real challenge for this public/private mixture of investment and activity will be to keep it moving in the national interest—that should be the guiding principle. That requires a lot of open discussion, which the Council on Competitiveness is trying to stimulate. There are deep questions about how to make sure that short-term com-



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mercial interests don't dominate to an unreasonable extent. We've begun to see some analogues in the success of things like Semiconductor Research Corp. So I tend to be optimistic, as long as we keep open a strong national discussion between the public and private sectors.

CIO: *How do you prevent compromise from diluting the quality of the finished product, as some critics have charged occurred in the compromise on a standard for high-definition television?*

VEST: The HDTV analogy is an interesting one. The end game of the FCC activities was a greater compromise than I wanted to see. Nonetheless, in just a couple of years, great progress has been made in bringing the industry together, starting from a point where people didn't even believe that digital technology was going to be a player. I also don't think the whole thing is over yet. I see more optimism than pessimism in the HDTV analogy. It gives me some hope that we can work together well.

CIO: *Many IS executives are already complaining about the difficulty of finding talented programmers and systems analysts. Will the implementation of a national information infrastructure affect organizations' technology workforce requirements?*

VEST: At the higher end, we are educating a lot of engineers and computer scientists despite the fact that they represent a relatively small percentage of the population. My guess is that it will follow the marketplace, and that our supply of top-level technical people is likely to be sufficient.

We are going to have to focus our attention in two places. First, we are going to have to strengthen the intermediate level of training and education: high-level technicians—people who in the 21st century will be equivalent to the skilled machinists of the mid-20th century. We need to do a better job in preparing young men and women for these occupa-

tions. And we will have to increase overall computer-literacy and comfort with technology starting in the K-12 systems. We have to work very hard on the lower strata—the people who have the lower-level service jobs and who work on the factory floors—so that they become empowered rather than left behind.

“FLEXIBILITY, REGROUPING AND the forming of new relationships will be enhanced as the infrastructure matures.”

CIO: *While the creation of an information infrastructure is generally treated in wholly positive terms, the Council's report describes a potential dark side: the disenfranchisement of information “have-nots.” What are the dangers here, and how can they be avoided?*

VEST: I think all of us are deeply concerned about the growing divisions in our society, and I think it speaks well of the membership of the Council that they pointed out that there is a dark side. As the information infrastructure develops, we need to avoid making the same errors [that have previously resulted in severe social and economic disparities]. This comes right back to my earlier comments that we must get people at all levels accustomed to using these new technologies and gaining literacy, comfort and facility with them at the earliest levels of their education. That's going to mean a tremendous investment in training and in our educational system, and it's a very daunting task.

If done right, the power of computing and of the information infrastructure can help smooth some of these problems. But if not, there's no question that just as in normal financial economics, the knowledge economics of the information infrastructure will increase those divisions.

CIO: *What should companies do to prepare themselves for the imminent arrival of the infrastructure?*

VEST: It seems to me that there are two or three things which should be done. First, we should be encouraging organizations to be quite flexible. Flexibility, regrouping and the forming of new relationships will be enhanced as the infrastructure matures. Second, I think executives should encourage their organizations to make creative uses of existing technologies—most of us are not even doing that very well yet—and by that means, encourage computer-literacy and capability among their employees. Certainly they should encourage, highlight and advertise creative uses of existing information technologies within their companies.

Finally I think we should all be doing a lot of brainstorming. A lot of idea-sharing occurs just by word of mouth. We should encourage openness among companies, at least at the higher levels, of what has been accomplished. And I think it behooves all of us to demonstrate projects that are having some success and to share that kind of knowledge and opportunity. The Council on Competitiveness intends sometime over the next several months to create a national showcase for such demonstration projects.

CIO: *What should CIOs be considering about the infrastructure when they're awake at 3 a.m., struggling to create a technology plan for their companies' futures?*

VEST: The real point is to get beyond the view of the information infrastructure as a piece of technology. It should not be thought of simply as a data highway. It is composed first of all of networks, but [it also comprises] digital libraries; databases; sets of services, applications and computer systems; and above all, trained people.

We should all be looking forward to a time of rapid and very poorly predictable evolution. And my prediction is that things will happen before we can plan them very well. ☐



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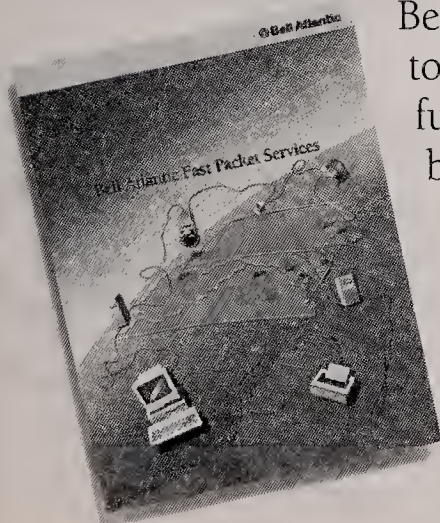
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MISSING LINKS

Linking disparate databases is such a knotty issue that some who have tried say it can't be done at all. But for those struggling down the rocky road to integration, achieving universal data access is worth it.

BY RICHARD PASTORE

SOME SAY IT CAN'T BE DONE. A few insist they have done it. Others are eager to sell you products that do it. But most who hold dear the dream of enterprisewide integrated databases say that though they've made progress, it's tougher than they thought. Integration strategies that work on paper break down as the enterprise expands and the mix of platforms becomes more complex. Linkage schemes that permit ad hoc database access falter in transaction-processing applications. And the goal of transparent universal access is for the most part as elusive as a white Christmas in Miami.

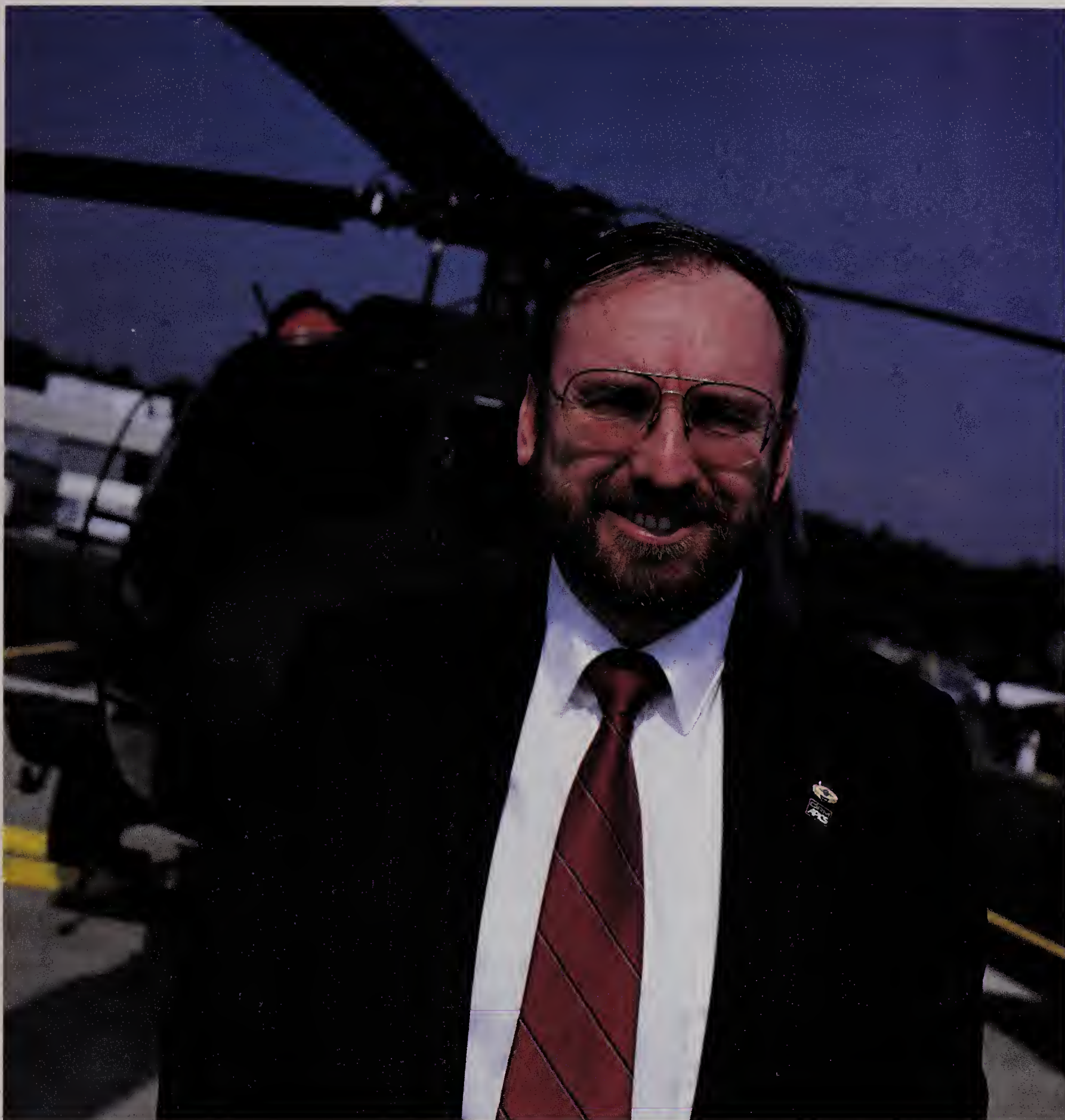
The successful minority has integrated disparate databases through relatively simple gateways or more-complicated transfer and conversion scenarios. Others have chosen to integrate the data at the user site rather than link the databases themselves. Despite these divergent paths, the underlying problem is the same for all: Isolated, multiple-platform databases hamper efforts to integrate business functions and reengineer processes.

"These databases have sprung up in an uncontrolled manner over the years," says Richard Finkelstein, president of Chicago-based consultancy Performance Computing Inc., who has tracked this challenge for eight years. "IS warned users that it would be hard to integrate all their renegade databases. Now the organizations are paying the price," says Finkelstein, who scoffs at the notion of simple, product-based integration.

Is it worth the hassle to integrate? Yes, if it can provide users with the universal da-



GERALD LONG: *A few bumps on the road to integration.*



ta access they need to take charge of their own decision-support and other applications. "Users no longer have to go through IS to request reports," says Herbert Chaplin, former director of IS at Ultramar Inc., a petroleum-refining and -marketing firm in Long Beach, Calif. "That saves on host processing—nearly 50 percent in one system. And that pays off because we pay our outsourcer only for the processing we

use." Universal user access wasn't practical at Ultramar before it chose Gupta Technologies Inc. products to link incompatible databases from SAS Institute Inc., IBM Corp. and Digital Equipment Corp.

Integrated data can also pave the way for an integrated enterprise. At Sikorsky Aircraft Inc., a division of United Technologies Corp., database integration was at the heart of an ambitious business-process over-

JOE MELE *helped get integrated manufacturing off the ground at Sikorsky.*

haul that won the firm a 1993 *Computerworld* Smithsonian Award for innovative applications of information technology. The five-year undertaking abolished the discrete departmental-manufacturing approach in favor of a fully integrated operation. A good chunk of the effort was devoted to integrating databases



HERBERT CHAPLIN: *Ultramar has yet to attain transparency.*

that "were built at different points in time with different technologies by different teams funded by different departments," says Joe Mele, manager of agile manufacturing for the Stratford, Conn., helicopter designer and manufacturer.

Most experienced integrators agree, however, that it's not worth the trouble to completely rewrite data into a new, common database. Though this is the most straightforward route to integration, the cost and time required are too extravagant for larger installations. "No one wants to put a lot of money into data reorganization," says Gerald Long, president of Summit Information Systems Inc., a subsidiary of Roadway Express Inc. (owned by Roadway Services Inc., a

trucking and package delivery firm in Akron, Ohio). "Seamless access and the ability to do what-if queries are a tough sell when you're looking at the bottom line."

Instead, the more-practical challenge is to integrate existing disparate databases and data for enterprisewide user consumption. The gateway, through which access queries and data can flow from one database to another, is the most common linking strategy. "Companies are using simple gateways to connect point A to point B, providing remote access from disparate systems," Finkelstein says. Sikorsky's integration consultant, Andersen Consulting, chose an Open Connect Systems Inc. gateway for a Unix-to-

mainframe database link and a custom Systems Network Architecture (SNA) gateway to link VAX and IBM mainframe databases.

But gateways have their share of handicaps. "They don't provide the functionality and performance, and the only ones that really work well are for the most popular databases, like IBM's DB2, because that's where the vendor effort goes," Finkelstein says.

Gateway bumps have surfaced at Roadway. "We're able to get data from place to place with gateways, but they're all a little bit kludgy," Long says. They also lack the simple user-friendliness for which Roadway is striving.

RATHER THAN laboring to integrate databases, an emerging trend has IS integrating data at the user interface. "The strategy is to integrate the output so that when it gets to the user interface, it looks as if your order, customer and marketing data all came from the same database," explains Robert Curtice, a vice president at Arthur D. Little Inc. in Cambridge, Mass. "It's quick, but it takes finesse."

Data replication and partitioning is one example of this data-jockeying approach. At International Flavors and Fragrances Inc., headquartered in New York, data resides in systems from Computer Associates International Inc., Microsoft Corp. and Gupta, running on a mainframe, a server and PCs, respectively. To provide universal access, integration tools partition this data based on which corporate division requires access to it, regardless of where the information originated. Then the software replicates the selected data at the local level, where users can access and manipulate it. If users make changes to the data, updates can be saved back to the originating database system.

This scheme works without gateways. "We don't use them, because we don't need constant data transfer," explains Lou Seigal, manager of distributed systems. Instead, the

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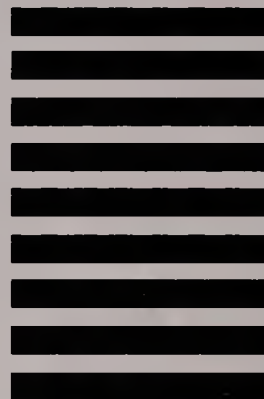


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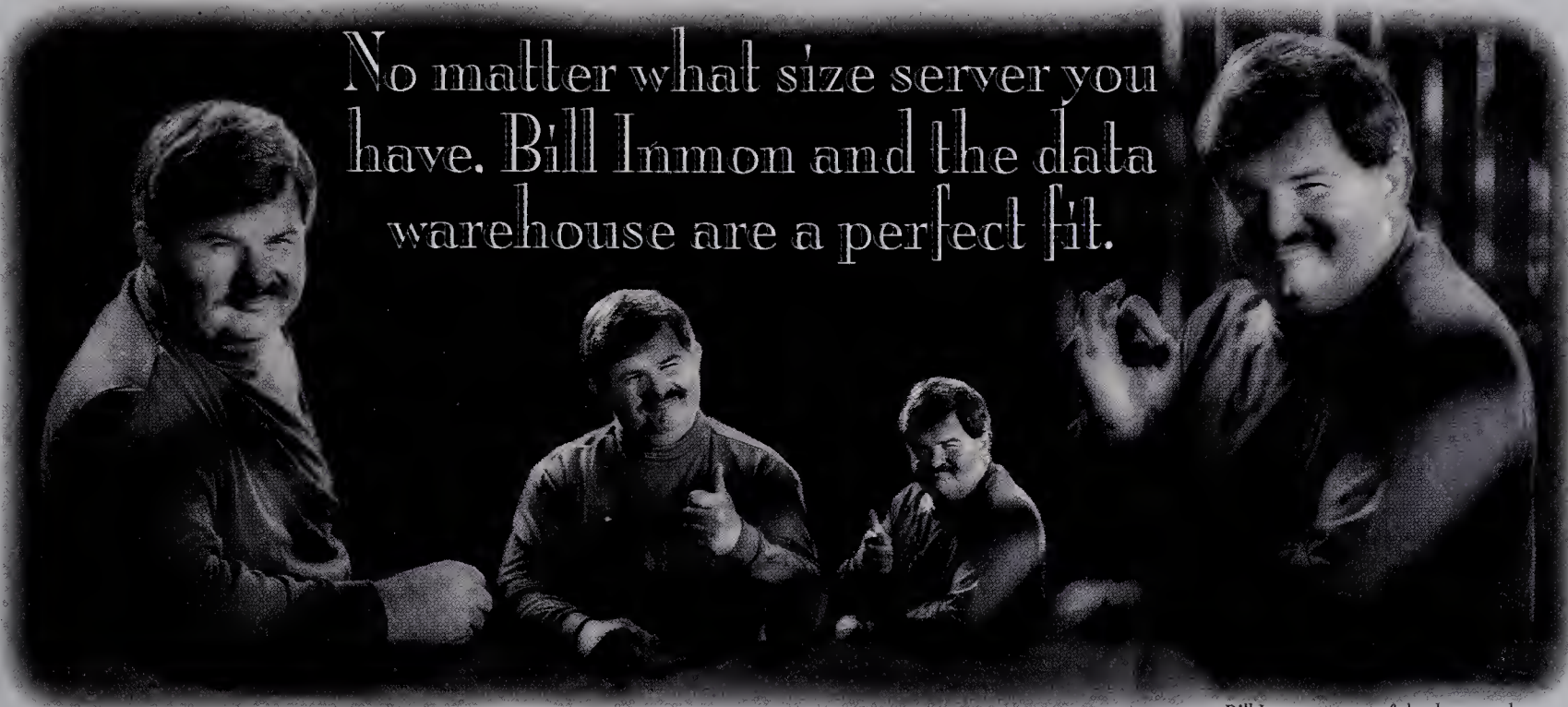
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firm contents itself with hourly batch transfers of both the replicated data and the user changes that flow back to the originating database. Seigal uses Infopump from Trinzic Corp., of Palo Alto, Calif., to automate and schedule the data replication and updates.

Similarly, Ultramar transports data from IBM VSAM and DB2 and SAS System 2000 databases to a Gupta SQL db relational database, where it is available in a temporary file for user access. "Our users can download data from any master database to Rdb and do their reporting from there," Chaplin says. The

pipeline works one-way only; data accessed from Rdb cannot be updated to the originating databases.

These strategies may work on paper or in smaller environments such as Ultramar's, which has only 65 users for this application. But add extra technical complexity or sheer size to the equation, and the best calculations can go awry. "You can do this on a small scale, but as you run up into a multibillion [dollar] corporation, identifying data requirements effectively is very difficult," Long says.

Vendors that integrate others' products with their own also ac-

knowledge the phenomenon. "Any single component will work as the supplier indicates, but when you have an increasing mix of products, the level of complexity goes up far more than the number of products involved," notes James E. Clark, general manager of NCR Corp.'s Cooperative Computing Systems Division in Columbia, S.C. Cooperation, NCR's operating environment, integrates multiple-vendor database and access tools.

Integration complexities take their toll most often on transparent data access. On a scale of one to 10, with 10 being complete transparency,



LOU SEIGAL: *Integration tools partition and replicate data at the local level.*

PHOTO BY JOYCE RAVID

organizations on average have achieved a two, according to Finkelstein. His gloomy rating seems warranted. Says Long, "Our goal was to have the user not need to know where the data is stored to access it." But that hasn't happened yet, and Long blames gateway glitches. Ultramar, too, has yet to attain transparency.

Even after completing an integration project in 1991, London Life Insurance Co. of London, Ontario, has not solved its transparency problems. "We'd like users to access data whether or not they know where it is located," says John Thompson, director of information resource management. But performance constraints force users and IS to know where the data is coming from in order to manage response times.

For the lucky few, transparency—like ignorance—is bliss. Most of Sikorsky's users have no clue as to where the data they desire is located—nor do they care, Mele says. Workstation users don't even know whether the data originated locally or on the mainframe.

WHEN IT COMES to integration, what works for one type of application may not work for another. In transaction-processing applications, users access a small number of data rows from a large number of tables, which taxes response time. Ad hoc, reporting-type queries draw data from many rows but from a small number of tables, requiring lower performance thresholds. Products designed for ad hoc applications are often unable to accommodate the greater response times of transaction-processing environments.

At London Life, DEC's Structured Query Language (SQL) Services and Vida access language for DB2 work well shuttling ad hoc SQL queries between users and the firm's DB2 and Rdb databases. Unfortunately, most of the insurance company's needs are transaction-oriented, not ad hoc. "Consequently, we've not developed as many applications

No Silver Bullet

.....
Microsoft's ODBC protocol may calm the beast of database integration, but it won't tame it

It will have a huge impact in the next 12 months! With such hyperbolic strokes, proponents are painting a rosy picture of Open Database Connectivity (ODBC), Microsoft Corp.'s implementation of the SQL Access Group-designed protocol. The proponents' rationale is that, as a de facto database-integration standard, ODBC will allow Windows-based applications and tools to access data from any vendor's compliant database. It sounds like integration nirvana. But ODBC, because of its lowest-common-denominator approach to openness, has weaknesses that limit its application, critics say.

"ODBC is a good idea—but it's just not the ultimate panacea that Microsoft would like people to think it is," says Donald A. DePalma, senior analyst with Forrester Research Inc. in Cambridge, Mass. DePalma's recent report knocked ODBC for its unproven performance, lack of certification procedures to guarantee compatibility, shaky network and database integration, and Windows-only support.

Adopting ODBC involves some trade-offs, such as loss of functionality and performance, and becoming permanently stuck within the ODBC framework, says Richard Finkelstein, president of Performance Computing Inc. in Chicago. "You'll end up writing to proprietary APIs [application program interfaces] anyway to access functions such as stored procedure calls [not supported by ODBC]," he says.

Prospective ODBC user James Cone, database manager at Fel-Pro Inc., an automotive-sealant manufacturer in Skokie, Ill., has reservations about the ODBC tools he plans to beta test. "One of my concerns is that they will be too generic to take advantage of a particular vendor's product strengths," Cone says. He is also uncertain to what degree other vendors will embrace the standard in their product offerings and, thus, how well those products will interoperate.

Computer Associates International Inc. has built ODBC support into its IDMS and Datacom databases and query and reporting tools. "It's wrong to dismiss ODBC because it's not a 100 percent bulletproof solution," defends Bill Pollack, director of planning at CA.

Does it hamper database management and query-tool performance? "Yes, in high-volume, mission-critical applications," Pollack concedes. But in ad hoc access applications, the performance trade-off is minimal and worth it in order to give the user single-tool access to all databases, he says. "It's not a marketing initiative; it's a bona fide technology and realistic solution for vendors and users."

—R. Pastore

since 1991 as we would have hoped, and we're looking at alternative products," Thompson says.

London Life is considering replacing its Digital software and database with Sybase Inc. products. "Sybase was originally designed for transaction processing," Thompson says. Sybase relies on stored procedures—in which data-access queries are pre-coded and stored for reuse.

That way, queries need not be rewritten and run on client hardware, saving time and reducing network traffic and the amount of overhead required to process each transaction. But will Sybase handle ad hoc access as efficiently as the DEC products? "I hope it will do ad hoc; it would be too much overhead to maintain both vendors' products," says Thompson.

Ad hoc access presents its own integration annoyances. Transaction-processing queries are well-defined, simplifying the setup of data formats and pathways. Ad hoc is more random, making it tougher to anticipate the business context of user queries. Without the limitations of proper context, a user might be inundated with 5 million answers to what seemed like a simple, specific data request.

“VENDORS ARE SCRAMBLING TO MAINTAIN THE APPEARANCE THAT THEY’VE GOT PRODUCTS. BUT A LOT OF PACKAGES ARE VERY EARLY IN THEIR LIFE, AND MAYBE THEY’VE BEEN HURRIED TO MARKET TOO SOON.”

—John Thompson

As Thompson and his peers have learned, vendors’ efforts in the integration field are, for the most part, embryonic. Wide-ranging integration products such as NCR’s Cooperation and niche products like DEC’s Vida have gained a foothold on shelves relatively bare of established competitors. Database-management vendors such as Oracle Corp., Sybase and Gupta already have a foot in the database door, so their integration products are finding a ready market. But integration standards and protocols, such as Microsoft Corp.’s Open Database Connectivity, are still in their infancy (see related story, Page 59). The upshot is that IS must proceed with caution.

“Vendors are scrambling to main-



JOHN THOMPSON: *“We won’t be building this kind of stuff ourselves.”*

tain the appearance that they’ve got products. But a lot of packages are very early in their life, and maybe they’ve been hurried to market too soon,” Thompson conjectures. “So you get a fair amount of hype to weed your way through, and that can be counterproductive.”

Others are even more cynical about vendors’ intentions. “They perpetuate this [integration] fairy tale because to them it means a lot of money,” Finkelstein says. “The platforms which they have to build on are too many and too fluid. It’s like an architect trying to design a building on land that’s constantly changing.” Finkelstein adds that too many CIOs lacking technological backgrounds fail to recognize these obstacles and get duped.

Nevertheless, integration veterans admit they couldn’t have gotten as far as they have without vendor support. “We won’t be building this kind of stuff ourselves,” Thompson notes. “You need vendor advice because there’s so much hype, and the products have differing degrees of

implementation practicality.”

At Ultramar, Chaplin relied on Gupta and NCR to do the initial installations as well as IS and user training. “Cooperation’s intrinsic value is that it’s already integrated with maybe 60 products. So we have the vendor doing all this integration for us,” Chaplin says.

Where is database-integration technology heading? For one thing, nearly everyone agrees that the pace of software introductions is already quickening. Others foresee hardware/software combinations that will make the integration challenge inherently easier. “I expect hardware development geared away from the general-purpose computer and more toward data-manipulation machines,” Roadway’s Long says. “They’ll take out the general-computing capabilities and turn it into a database machine capable of high-speed data manipulation and easier, more-transparent access.” Even then, there will still be curmudgeons who insist integration can’t be done, and even more vendors will be anxious to sell you ways to do it. ☐

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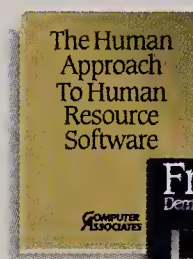
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CONTINENTAL DIVIDES

For many multinational companies, the world is simply too big a place for central control to be manageable. Regionalization offers the increased coordination and economies of scale of global operations while retaining local flexibility and responsiveness.

BY ALLAN E. ALTER



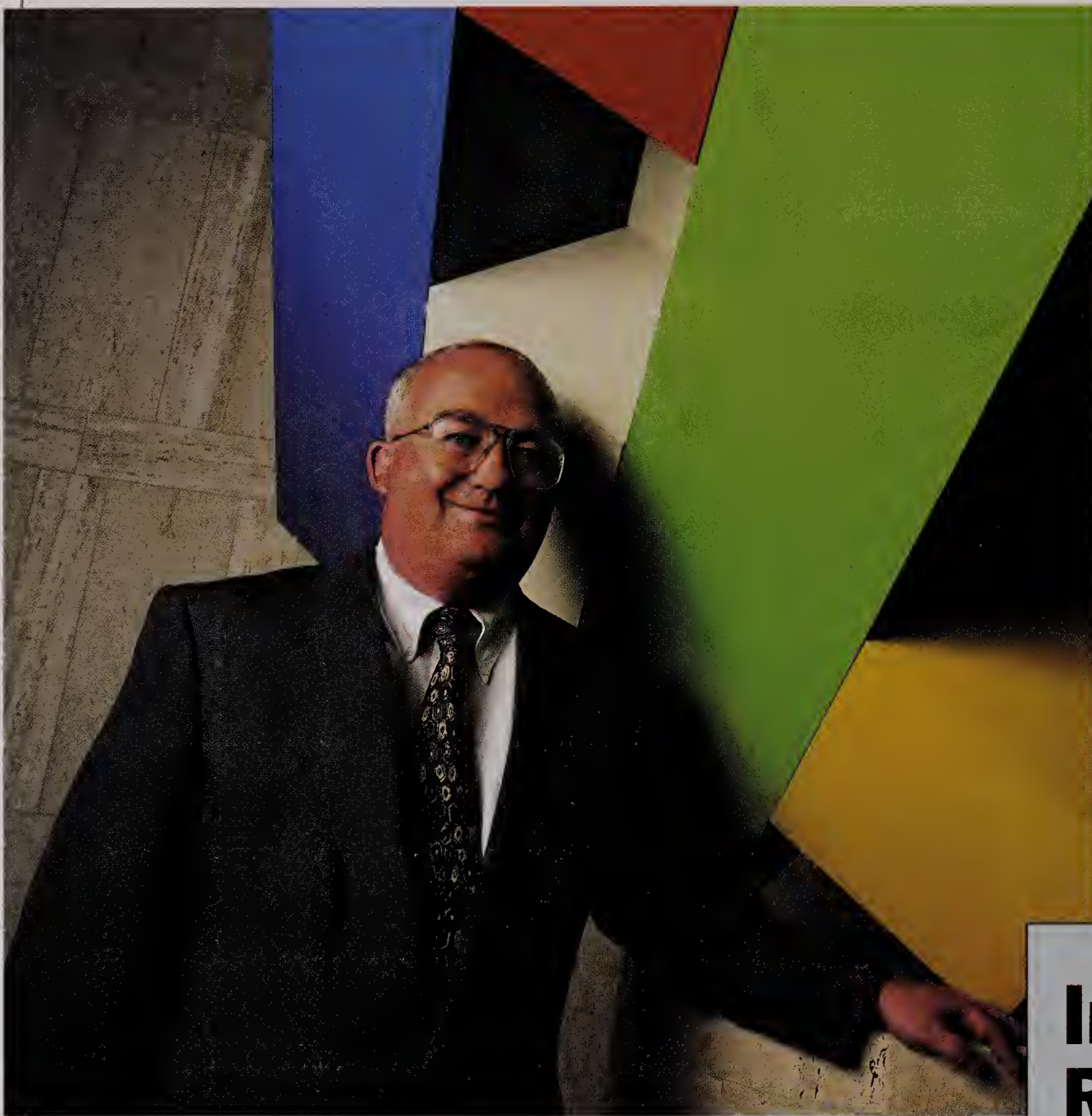
ere are two multinational organizations, as different from each other as sausage and sushi. Organization A operates in Europe, and Organization B operates in Asia and the Pacific Rim.

Organization A's employees are grouped primarily by the products they sell; B's are separated into country units. At Organization A, international coordination is a way of life; at Organization B, relatively little takes place, except within clusters of two or three countries. A's facilities are linked by distributed networks; B's networks connect each country to corporate headquarters in the United States.





HARRY HAMMERLY: *"If we wanted to take an action across Europe, we had to get 17 product managers from different countries together. Now we can implement a European decision across regions. It's much simpler."*



DAVID DREW: 3M wants to "manage customers at a totally European level."

Yet different though they are, these organizations are both part of 3M of St. Paul, Minn. This broadly diversified manufacturer operates more than 50 business units and sells 60,000 different products around the world. But while 3M has a global electronic-mail network, for the most part it operates on a regional basis: It divides its global operations into five continent-sized "areas"—North America, Latin America, Europe, East Europe/Middle East and Asia/Pacific Rim—each with its own approach to conducting business and managing information systems, according to Harry Hammerly, executive vice president of international operations.

The globalization trend may get the spotlight, but peek behind the curtain and you will often find regionalization is an important compo-

nent of a worldwide business strategy. "3M exemplifies an approach being adopted by other companies," says Barry Hedley, group managing director of Braxton Associates, the international strategy consulting division of Deloitte & Touche Tohmatsu International.

There is no one way to regionalize, but multinationals that do so have this in common: They divide themselves into large geographic units—such as continents or countries bound by a common language, culture, political system or level of economic development. Each region may operate differently, having little coordination with the others. Besides IS, such functions as product development, manufacturing, distribution, personnel, purchasing, customer support and marketing are operated on a regional instead of a

country- or worldwide basis. And business decisions such as investment locations, product mix, competitive positioning and performance appraisals can be determined regionally as well.

Regionalization provides many of the benefits of global coordination, which can be devilishly difficult to manage. It offers economies of scale by using common parts in products sold across a region. And by eliminating the duplication of functions and business processes within a group of countries, cycle times can be improved, according to Donald A. Marchand, dean of information studies at Syracuse University and a

International Relations

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It's not always easy for IS staff to build a rapport with their internal customers. When the users are in other countries, the difficulties are compounded.

Regionalization makes financial sense as part of a global IS strategy, but distrust and misunderstandings caused by differences in the nationality of users and IS staff can make it a difficult strategy to implement.

A few years ago, Peter Cook, director of information systems in Europe for Digital Equipment Corp., be-

participant in the Manufacturing 2000 research project of the International Institute for Management Development in Lausanne, Switzerland.

At the same time, a regional organization can still be responsive to local preferences. According to a study published in the winter 1991 issue of *Organizational Dynamics* (a publication of the American Management Association in New York), Sony Corp., Toshiba International Corp. and Thomson Consumer Electronics Inc. sell different television sets in each European country in accordance with local tastes, yet they design and manufacture them in a handful of facilities in Europe.

3M's approach to regionalization reflects its corporate culture, which encourages entrepreneurism, consolidation of functions when possible and technical standardization to ensure a free flow of information (see "The Company that Innovation

Built," *CIO*, August 1990, and "Winning Combinations," *CIO*, August 1992).

For 3M, regionalization is a means of achieving the right balance between local autonomy and central control in each part of the world. For instance, the diversity of the Asia/Pacific Rim area and the political instability and underdevelopment in Latin America have made regional integration in these two areas difficult. So 3M gives local business managers considerable freedom—to make their own decisions on which products to sell, how to package and market them and which suppliers to use. But, with the exception of Japan, it sets hardware and software standards and develops applications for them in St. Paul, according to Hammerly and David Drew, who reports to Hammerly as the vice president of information technology.

In contrast, 3M's European area, which includes Scandinavia and

Western and Central Europe, has long enjoyed more internal coordination. While local European business managers have retained considerable autonomy, suppliers and product modification have been managed on a European basis for more than 20 years. Some information systems—such as financial reporting, sales information and E-mail—have been standardized for some time as well. Now economic integration has led 3M to more fully integrate its

*Multinational
companies in Europe
"want to buy on a
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across Europe."*

—Harry Hammerly

gan to reorganize DEC's European IS function. Cook believes that although developing applications and managing the IT infrastructure are done most cost-effectively on a global basis, a regional approach is the most efficient way to deliver IS solutions to DEC's European users. "Clear evidence from our current statistical cost models [based on benchmarking data collected by DEC] tells us that," says Cook, who has offices in both Reading, England, and Geneva. Furthermore, time-zone differences make globalized support unfeasible.

However, progress in implementing regional support organizations has been slower than Cook anticipated. The reason: Country managers have fought to retain autonomy. "The fundamental issue is trust.... For example, we are targeting to deliver all our IS support for our European telephone [catalog] sales and support operation out of France. The people who do the work will be in the United Kingdom. Do British telephone

sales managers trust the French IS people to worry about them the way the people sitting next door to them would do?"

To make a regional IS-service model work, you need a common language—usually English—and a "multicultural-belief model," says Cook. "You need to have the people working on a pan-European basis accepted as full members of the team by all the consumers of IS services." And it requires IS staff who can relate to clients from other cultures.

Cook recalls one French IS-service-delivery manager who failed dismally in this respect. French culture is traditionally hierarchical; so, unfortunately, was this manager's management style. "Because his boss dictated to him, he thought he could dictate to his customers. That was OK in France but completely unacceptable in the United Kingdom and Scandinavia, where customers expected him to act on a client-supplier basis."

—A.E. Alter

European operations and reorganize IS. The process began in 1991, when order-processing and production-planning systems in 17 countries were replaced by an integrated, pan-European system known as EUROMS.

Between January 1992 and June 1993, 3M's European operations underwent a massive reorganization. The company created 18 pan-European business units, known as European business centers (EBCs), and gave them much of the responsibility once vested in the local business units.

The reorganization also inaugurated a fresh approach to governing the IS function. 3M's 21 data centers in 17 countries are being consolidated into five service-delivery centers; each acts as an information warehouse, an information-services de-

livery center and a data-processing center.

3M set up a European IT-management committee made up of the IT managers in the five countries that have service-delivery centers; Peter Godfries, director of information technology in Europe; and Drew. The committee has decision-making as well as advisory responsibility for creating Europewide applications and resolving European IS issues such as standardization and technology transfer. "They are charged with making the whole of Europe work," says Drew.

The reorganization was necessary, says Hammerly, because "more customers are becoming European cus-

tomers rather than one-country customers." A French business may have acquired companies in Germany or the United Kingdom, or be expanding into other European markets. "They want to buy on a European basis on one contract, and [they] look for similar programs and pricing across Europe." 3M's old, country-focused processes and orga-

nizational structures were out of step with European business trends.

For example, an order placed in Austria took seven days to reach a factory in the United Kingdom because it had to be entered and trans-

mitted instantly throughout Europe. Furthermore, making Europewide decisions was an unwieldy process.

"We need information systems that will tell us the status of all the orders a customer has with us and systems that will tell us what the customer has been buying across Europe."

—David Drew

mitted instantly throughout Europe. Furthermore, making Europewide decisions was an unwieldy process.

"If we wanted to take an action across Europe, we had to [get] 17 product managers from different countries together and have a consensus," Hammerly says. Even then, other local managers could override the group's decision. Under the reorganization, each EBC is responsible for managing a particular business throughout the entire European area. The EBCs' headquarters are scattered across Europe, the locations often determined by the site of a major plant or laboratory. 3M's tape EBC is run out of Brussels, the chemicals EBC is in Antwerp, Belgium, and the telecommunications EBC is in Hamburg, Germany. While there are still separate sales and marketing forces in each of the eight "regions" that make up the European area, the EBCs now have the lion's

share of power and authority. "Now we can implement a European decision [across regions]," says Hammerly. "It's a much simpler decision-making process and orientation."

No reorganization is guaranteed to be successful, and much of this particular reorganization's success will depend on whether 3M's IS organization can establish a manageable



A CHANGING EUROPE has led 3M to further integrate operations.

tomers rather than one-country customers." A French business may have acquired companies in Germany or the United Kingdom, or be expanding into other European markets. "They want to buy on a European basis on one contract, and [they] look for similar programs and pricing across Europe." 3M's old, country-focused processes and orga-

nizational structures were out of step with European business trends. The EUROMS system (based on CA-DataCom, a mainframe database program from Computer Associates International Inc.; CICS, IBM Corp.'s online transaction-processing system; and homegrown distributed database-management software) has provided a solution, according to Drew. Now an Austrian

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balance between local autonomy and the power vested in the EBCs. Hammerly is eager to see IS cut costs through consolidation; he also wants to further standardize 3M's systems, architecture and data management so that its business processes can be improved. Yet the European IS organization needs the freedom to create solutions that meet local requirements.

Steps have been taken to ensure that IS management and staff develop a European perspective. IS managers now report not just to the management of their local 3M companies, but also to Godfries. And rather than create a large European staff, the IT-management committee has assigned Europewide missions to the IS staffs in the five largest regions. The German IS group is responsible for creating European sales applications; Italy is charged with planning how applications will be developed throughout Europe.

"By assigning missions to the personnel in the countries, we get their participation in the development of the European requirements and infrastructure," says Drew. These missions have been a real motivator and challenge to the people in these organizations "at a time when there's been a lot of downsizing and re-architecting of IT."

Assuming that good management, corporate culture and international experience can transform 3M's European nationals into general Europeans (no small matter; see related story on Page 64), the main challenges now appear to be in the areas of software and data.

One problem 3M is facing is how

Rules of Regionalization

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Moving to a regional framework involves major organizational change, and every lesson about managing change applies. But regionalism has a few extra requirements of its own for CIOs:

- **Keep** in mind the central business problem of globalization: achieving the benefits of global coordination while retaining a local focus.
- **Decide** which IS activities are best conducted at the global, regional and country levels. You may need to divide these activities differently in each part of the world.
- **Establish** a global framework for the IS function that balances the need for standards and local flexibility. These should include standards for data management and transaction messaging, a technical framework for hardware and operating systems, and guidelines governing the building and selection of applications and how IS operations are conducted.
- **Expect** to change your IT infrastructure. Communications networks, software, databases and data centers will have to be reconfigured, consolidated and strengthened. You will also need operating software and middleware to control distributed applications and interfaces.
- **Head** off power struggles by giving local officials and staff their own pan-European responsibilities.
- **Find** people who are comfortable working in a multicultural environment. IS personnel need to be sensitive to variances in national cultures and customs. —A.E. Alter

to standardize on the same release of a software package throughout Europe. Another is data standardization: The EBCs need financial reports, sales reports and other information summarized on European as well as local and global levels. However, data-management standards,

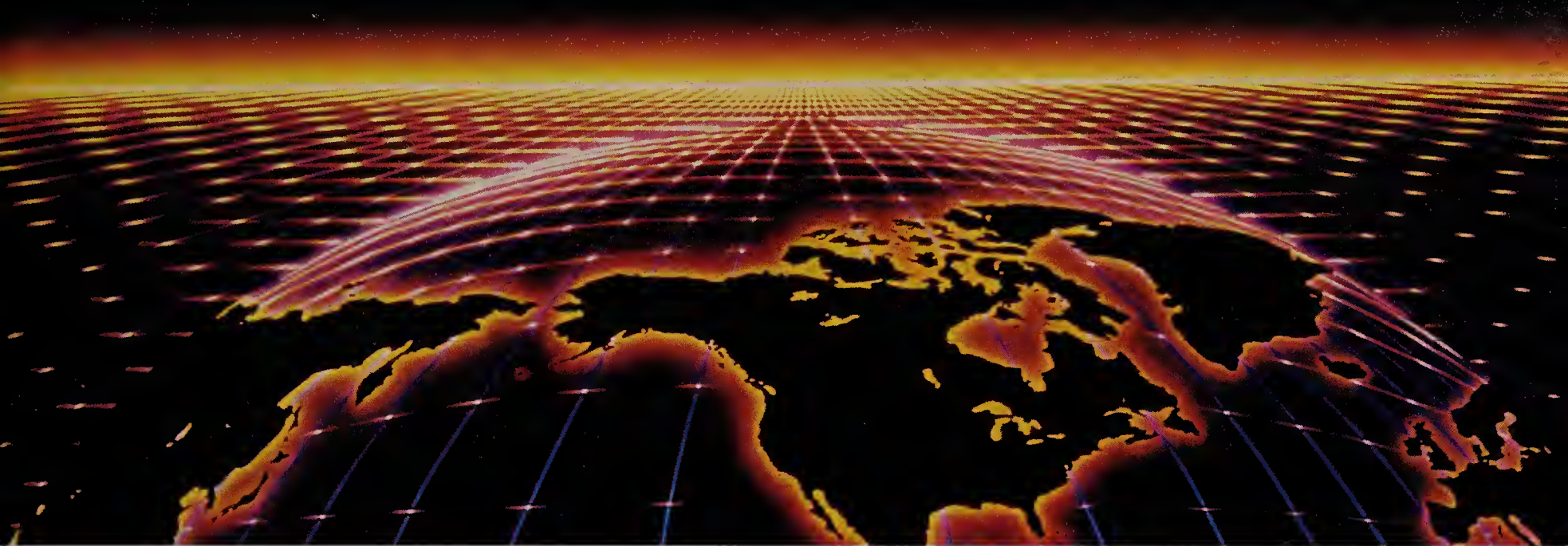
such as those governing the product codes and code structures used to track 3M's 60,000 products, still differ from country to country. Forging data standards that are uniform enough for Europewide reporting yet flexible enough to reflect local differences in how products are sold will be one tough job. Post-it Notes, for example, are sold in different sizes, colors and packages in each country.

3M also needs to build new Euro-applications. Drew has in mind a European inventory system and systems that will enable 3M to "manage customers at a totally European level rather than only within each country. We need information systems that will tell us the status of all the orders a customer has with us [and] systems that will tell us what the customer has been buying across Europe." This can be done in a rudimentary way now using 3M's global E-mail network. But it's inadequate to the task of tracking orders placed by large companies. "We have many customers that want to deal with 3M worldwide but want to do it only in one country," says Drew. For example, a large Swedish customer wants to place orders on behalf of its factories in Europe, Japan and the United States through 3M's Nordic region.

Obviously, that will require more than just a regional tracking system, as Drew and Hammerly well know. For all its potential benefits,

regionalization can only be part of, not a replacement for, a global strategy and IT infrastructure. Regionalization is a useful option, but it is no more a panacea for the complexities of global business in the '90s than sticking a "Think Globally, Act Locally" bumper sticker on your car. ☐

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SOME NEXT-BEST THINGS

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Meetings may never be the same, now that an increasingly rich assortment of video, audio, graphical and hybrid electronic tools puts remote participants virtually in touch with the agenda

BY LUCIE JUNEAU



k a c z m a n



Businesses have long looked forward to the day when interacting with distant colleagues would be as simple as meeting with co-workers down the hall. Unfortunately, high prices have kept videoconferencing beyond the reach of many workers. But as supporting technologies have matured, and as product prices have fallen, electronic-meeting tools have begun to proliferate.

The use of audioconferencing equipment is now commonplace in many companies, and videoconferencing is moving beyond a few fixed installations in corporate meeting rooms, even to the desktop. Interactive graphics support, in the form of whiteboard systems and other kinds of shareable resources, is adding valuable content to these collaborations and removing many of the disadvantages of remote participation. CIOs now have a variety

of meeting-support options and price categories to choose among in mixing and matching technologies with business uses.

The most prevalent and least expensive of these technologies is audioconferencing. Until recently, most audioconferencing products have used half-duplex audio systems: Only one side's input can be heard at a time. Now a new generation of products is sending traffic in both directions. Products such as Polycom Communications' SoundStation and NEC Technology Inc.'s Voicepoint use full-duplex audio systems that enable conference participants to transmit audio signals to one another simultaneously.

Until this year, the American Bar Association (ABA) relied on a half-duplex conferencing system that inadvertently encouraged conference participants to compete for control of the microphone, says Diana Gilbert,

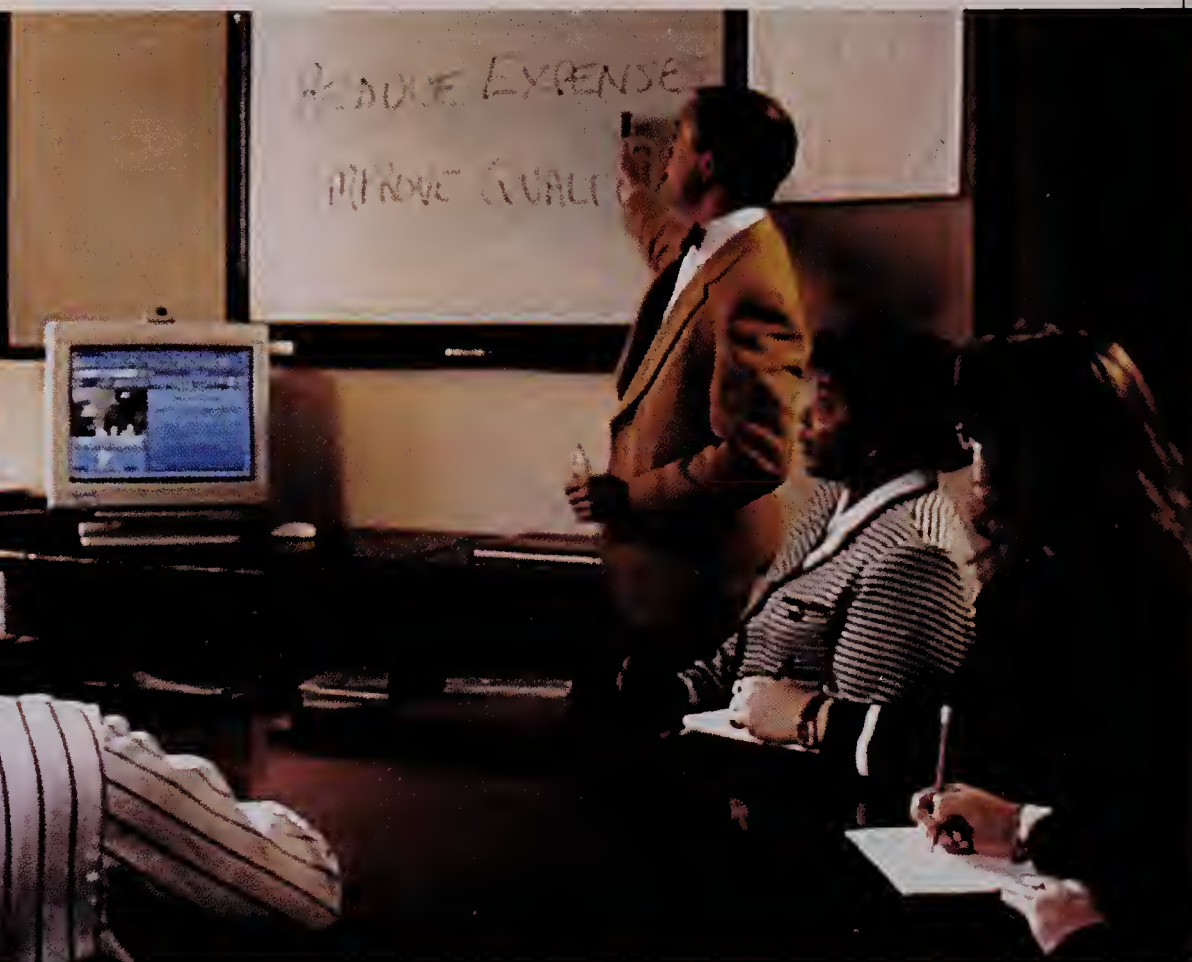


director of administrative services. "Some members became really good at being able to control the conference," Gilbert says. Since the loudest noise gets the microphone's attention, "if the person on the other end [of the conference call] was shuffling papers, you took the mike back by knocking on the table so you wouldn't have to listen to the paper shuffling. It was quite comical," she says.

The ABA's new, full-duplex audioconferencing equipment, Polycom's SoundStation, allows all of the parties in an audioconference to be heard simultaneously. The result is a more-natural exchange, Gilbert says. The advantages of the full-duplex system were recently demonstrated during a conference call with a woman who was working at home in the company of her baby, whose vocalizing could be heard in the background. "In the olden days, the baby would have [unwittingly] seized control of our microphone," Gilbert says. Because both sides could now communicate simultaneously, the woman's co-workers didn't have to hammer on the desk indecorously to make themselves heard.

Using audioconferencing equipment also reduces the ABA's travel budget, although the organization hasn't calculated the savings. "My analysis is that the cost of a typical conference call is equivalent simply to cab fare to the airport," Gilbert says. "I think that's why [audioconferencing] has caught on so much. It's a natural way to reduce expenses."

Investing in a videoconferencing system, although much more expensive than purchasing audioconferencing equipment, can also save on travel expenses and boost productivity, users say. Videoconferencing equipment from VTEL Corp. has made senior managers at New York-based financial-services firm CS First Boston Group Inc. much more productive, according to Ruedi Stalder, chief financial and adminis-



VIDEOCONFERENCING boosts productivity, saves travel time and expense, and allows people who wouldn't normally attend certain meetings to participate.

trative officer. After a videoconference, participants go back to their offices and work instead of sitting around an airport. Because companies are no longer slaves to airline schedules, meetings can be scheduled at participants' convenience and without lengthy planning. Stalder, who is also on the executive board of CS First Boston Group's multinational parent company, CS Holding, says the board is now able to supplement its regular, face-to-face meetings with videoconferences. As a result, its members have to meet in person less often.

Establishing a videoconferencing system that users are comfortable with can be a matter of trial and error.

Videoconferencing systems that provide voice-activated camera support for multipoint conferences are sometimes considered superior to systems requiring manual camera operations. But Stalder and other executives at the firm don't care for the voice-activated multipoint systems they're currently using, be-

cause they are often distracting. Even throat clearings and other non-conversational sounds (or "off-camera" asides not meant to be part of the official conference) can draw the camera's eye. "If someone coughs, you see him or her coughing," Stalder says. Furthermore, voice-activated systems don't capture all the action or atmosphere. And, he adds, "If you never say a word, nobody sees you."

Stalder prefers a system that would allow everyone to continuously see and hear all conference participants at the same time. "To work like [you would] at a normal meeting, it's very important to see reactions from everyone," he says. CS Holding plans to work with



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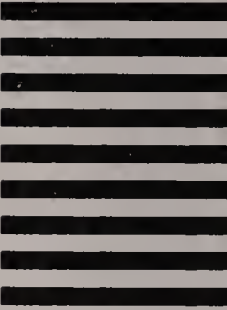
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VTEL and telecommunications vendors to enhance its system so that it can provide simultaneous videoconferencing at at least four locations.

One of videoconferencing's greatest benefits is that it enables people who wouldn't typically travel to meetings to participate in them, according to Harvey Shrednick, senior vice president of information services at Corning Inc. in Corning, N.Y. "You can have background people with vital information that could influence decisions, who might not normally be heard from because of travel schedules, budgets and other things that get in the way," he says.

Corning purchased its first videoconferencing units three years ago and now owns about 20 PictureTel systems. Falling prices have allowed the company to broaden its use of videoconferencing, according to Shrednick. A PictureTel system that would have cost around \$100,000 five years ago can now be purchased for roughly \$14,000, although PictureTel's top-of-the-line System 4000 ranges from \$25,000 to \$48,000. (And to include multiple sites in a videoconference, users must also purchase a multipoint bridge or lease a multipoint service from a telecommunications carrier such as AT&T.) Telecommunications charges have fallen, too. The cost of a one-hour, coast-to-coast video call on a dial-up network is now less than \$15, and transcontinental charges for public dial-up lines dropped from about \$150 an hour in 1987 to less than \$20 an hour in 1989. Most of Corning's locations are linked via dedicated leased lines. But when the company initiates a videoconference with one of its European offices, it relies on public circuits.

While many companies are beginning to use videoconferencing to minimize travel between their locations in the United States and their operations abroad, Corning has gone a step further: It conducts videoconferences with selected customers, some of which have purchased PictureTel equipment to ensure full compatibility with Corning's systems. (Theoretically, any videocon-

ferencing systems supporting the H.320 video standard developed by the International Telecommunications Union, Telecommunications Standardization Section [ITU-TSS]—formerly the CCITT—can interoperate, but most systems' advanced features only work when connected to units from the same manufacturer.)

Corning uses videoconferences to discuss design requirements for the Corning-made high-tech components its customers incorporate in their own products. Corning engineers are able to meet with client representatives through a videoconference to review changes in specifications, for instance. A close-up feature on the video camera is used to

he's working at the other. Besides facilitating collaboration between the two firms, the system also supports each company's internal communications.

Although desktop systems are often used for one-on-one collaboration, Starer uses his systems primarily for small-group meetings. Many of the companies' conferences involve documents, so obtaining a meeting-support tool with strong document-handling capabilities was important. "What we've focused on is the ability to look at documents and graphics and annotate them in real time," Starer says. "Anytime someone looks at any videoconferencing system, the first thing they

One of videoconferencing's greatest benefits is that it enables people who wouldn't typically be in a position to travel to meetings to participate in them.

review documents. Sometimes, when documents are detailed, or if they're annotated with handwritten notes, conference participants exchange facsimiles.

Many audio- and videoconference participants do rely on fax machines to communicate document information. Before purchasing GTE Vantage Solutions' Desktop Video Teleconferencing System (DVTS)—a Windows-based system for simultaneous video, voice and document conferencing—Bob Starer, the CEO of two companies that do business together, typically conducted long-distance meetings using both a speakerphone and a fax machine. The arrangement was cumbersome, he says. He recently purchased five DVTS units for his two firms, Computer Dynamics Inc., a company offering systems-integration services, and Cataract Inc., which provides engineering and technology for the nuclear-power-plant industry. Starer uses the systems to check in with staff members at one company while

look at is the color and quality of the video image. But what we really focus on is the document we're reviewing together—the photo, engineering drawing, whatever it is. The video is the sizzle. The red meat is looking at the document together."

Some desktop videoconferencing systems, including DVTS, provide shared work spaces and shift the focus from participants' voices or faces to the meeting's documentary content, making it easier to communicate ideas. Like some other desktop systems announced by such vendors as PictureTel and AT&T, DVTS enables conference participants to view and annotate documents in real time. Images are typically preloaded and transferred between locations before the meeting begins to avoid transmission delays. Participants may view live video images of one another in a window on their screens while they're working on a document. They can annotate the document using the PC's mouse, or use a pen and tablet instead. Changes made on ei-

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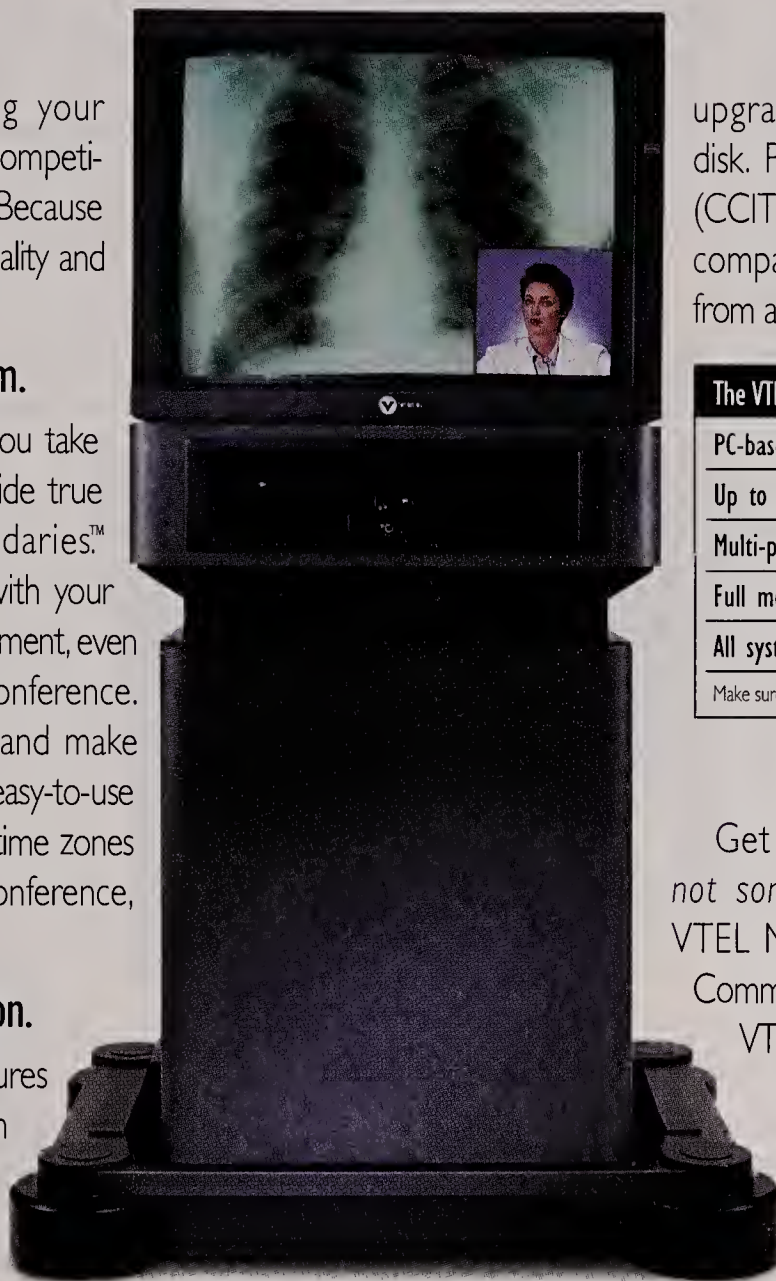
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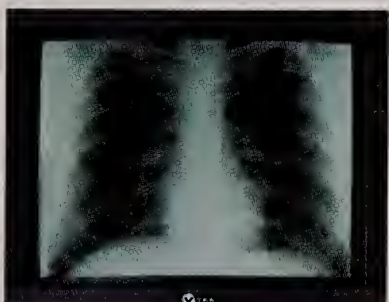
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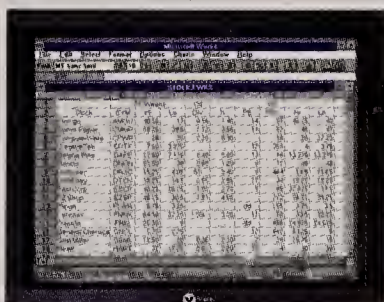
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ther side of the videoconference can be seen in real time on both sides. At the end of the meeting, annotated images are saved to the directory of the original owner, who may then send copies to other participants.

Desktop video systems are significantly cheaper than larger conference-room systems and thus will very likely lead to broader use of videoconferencing, analysts say. But the first generation of these products, generally priced between \$5,000 and \$10,000, will be out of reach for most users, says Allan Sulkin, president of TEQConsult Group in Hackensack, N.J. Furthermore, there is currently no established method for distributing data to multiple points. So, in many cases, desktop videoconferences are now limited to two locations. When the ITU-TSS completes its work on the multipoint standard, and desktop videoconferencing prices drop, worker productivity may begin to rise as remote workers and workgroups take advantage of desktop video systems. Among other advantages, these systems would enable employees working at home to collaborate more easily with colleagues at the office. That might encourage more companies to use home-based workers, making it easier for these organizations to comply with increasingly stringent environmental-protection regulations (mandating lower auto-emission levels, for instance) or the Americans with Disabilities Act.

Until the price of desktop videoconferencing systems does begin to fall, many users who already know one another may choose to collaborate without the benefit of video. Databeam Corp.'s FarSite, which runs on Sun Microsystems and Windows platforms, is an example of a software product that allows users to review, edit and annotate images together in a shared work space but doesn't include a video component. The product is priced at less than \$1,000 per desktop.

Users who need to convey visual information but don't require moving images—including workers in

the advertising industry, engineers and medical professionals, for instance—may like AT&T's Picasso Still-Image Phone, priced at about \$3,000. The product allows users to send high-quality still images between Picasso telephones while talking over the same telephone line. The images may be generated live by a video or document camera,

“We focus on the document we’re reviewing together—the photo, engineering drawing.... The video is the sizzle. The red meat is looking at the document together.”

—Bob Starer

or they may have been stored on videotape, digital cameras or photo CD players. Users may display the images on television screens or their PC monitors, mark them up with a stylus and view the changes at both locations. One distinct advantage of the Picasso product is that, unlike videoconferencing, it doesn't require the use of special, high-speed telephone lines.

Organizations that might benefit from the ability to display ideas graphically in a large-meeting-room situation can invest in electronic whiteboards such as Xerox Corp.'s LiveBoard or the Smart 2000 SmartBoard from Smart Technologies Inc. Xerox's LiveBoard, priced at about \$50,000, is a Windows-based whiteboard that incorporates a 486 PC, modem and a video card enabling users to display video images in a

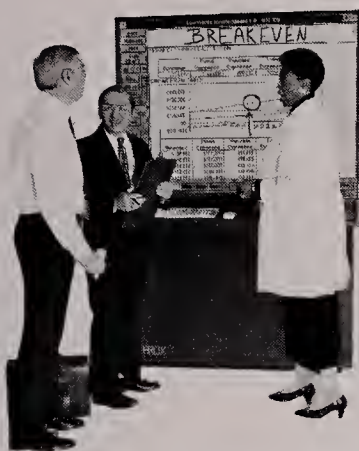
window on the board. (A video codec would be purchased separately from a videoconferencing vendor such as PictureTel, Compression Labs Inc. or VTEL.) The board can be used to display or annotate computer files or to create new images using a special pen. All changes to the board are seen instantaneously by remote conference participants. And SoftBoard, a \$2,995 whiteboard device from Microfield Graphics Inc. that will ship in November, captures information written on the whiteboard and simultaneously displays it on a nearby PC or Macintosh, which connects to the unit via standard serial cable. The data can then be saved, printed, used in other applications and shared with other users—even those in multiple locations (see “FYI,” Page 92).

Electronic-conferencing solutions will grow more attractive as product prices continue to fall and companies continue to look for ways to stretch their resources. At the ABA, conference planners are now quick to consider an audioconference when a member raises the possibility of scheduling an off-site gathering. “The first question we ask is, ‘Do you truly need a face-to-face meeting?’” Gilbert says. Although travel still represents a large portion of the ABA's budget, members are unlikely to travel now unless they really need to interact in person.

The CIO's role in facilitating electronic meetings is to suggest appropriate tools when they can be used to solve real business problems, analysts say. Establishing pilot programs where there is currently a need for extensive travel and collaboration could give companies a running start on the competition, providing them with the opportunity to sample various meeting-support options while working out related networking issues. There are times when only a face-to-face meeting will do. But in many instances, an electronic meeting can get the job done with less expense and aggravation. ☐

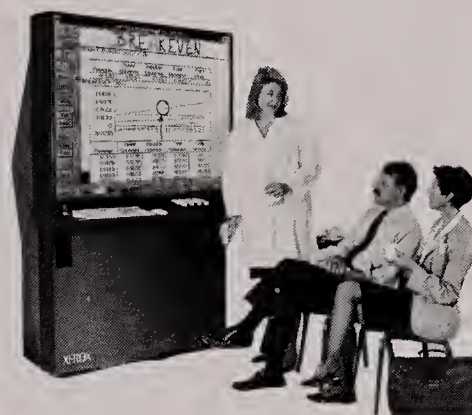
Lucie Juneau is a freelance writer based in Salem, Mass.

Now you can put it together when you're not together.



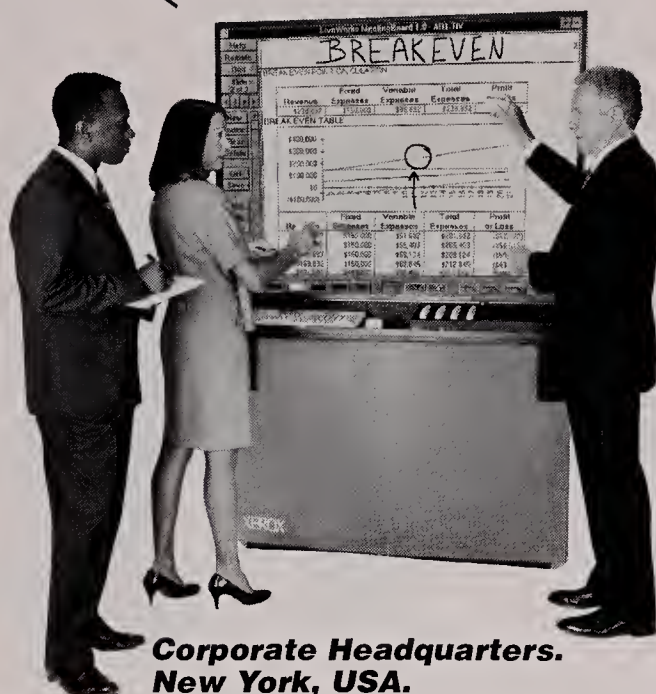
Research and Development. Santa Clara, USA.

The design concept originators discuss prototype costs with the task force.



Manufacturing. Cambridge, England.

Design modifications to meet projected cost estimates are suggested.



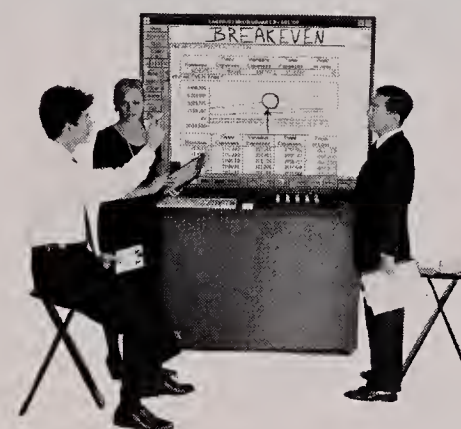
Corporate Headquarters. New York, USA.

Costs and schedules for the task force are coordinated by the workgroup leader.



Regional Sales. Houston, USA.

Anticipated reseller margins and justifiable price points are discussed.



Design Engineering. Nagoya, Japan.

The cost of line extensions for future market opportunities is analyzed.

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Career Uplift

At Texas Instruments' Employee Development Center, IS professionals help peers who feel trapped in unfulfilling careers

BY SUE PATTERSON

As a systems analyst at Texas Instruments Inc., Dennis Watts thought his career had bogged down. He was unhappy with his assignments, found little challenge in his work and, eventually, thought about leaving TI.

Instead, Watts visited the Employee Development Center, a resource for career guidance within TI's Information Systems and Services (IS&S) Division, in Dallas. (IS&S is responsible for TI's global communications and computer network, one of the largest in private industry.) Through a variety of programs, the center helps IS&S employees better understand what they want from their careers and how to achieve their goals. In return, TI benefits from the improved productivity and morale of more-empowered, happier employees, and from reduced employee turnover.

Since its opening in April 1991, more than 2,000 employees have utilized the center, which was developed after an internal employee survey revealed concerns about career

opportunities. Like many large corporations, TI has recently undergone a flattening of management layers, moving from a vertical to a horizontal structure and making it necessary for employees to set goals other than the traditional climb up the corporate ladder. The center directs them toward unexplored opportunities and encourages them to take responsibility for their own career development.

The center's objectives are based on three conclusions: Structured training improves job skills, thereby increasing job effectiveness; an environment that encourages individual initiative for self-development supports IS&S's need to maintain a high skill level among its staff; identifying skills required for future job assignments will prepare employees to meet the corporation's challenges.

To keep abreast of current technology needs, IS&S staff periodically interview TI managers and senior technical staff. An outside research group is also used to gauge the demands of the technical community. IS&S then develops the training necessary to prepare employees to meet those needs, and the center directs employees to the appropriate programs, whether they are inside or outside the organization.

What makes the program unusual—and effective—is the center's use of divisional employees as senior advisers. Although personnel specialists are a valuable resource, sometimes the best source for career information and guidance is someone who knows that career firsthand. Senior advisers are ideally positioned to discuss training needs, degree-planning, job opportunities, technical challenges and other related subjects.

Approximately 75 mentors volun-



teer their time during the work day to act as senior advisers, serving not only as counselors but also as role models. Drawing on their personal experience and professional expertise, they can provide a valuable reality check while helping fellow employees explore career-path options. These advisers also offer a broad organizational perspective, and because they share many interests and experiences with the people they help, they inspire a level of trust that few professional counselors could approach.

Senior advisers are nominated by managers from their staffs. Managers look for employees with excellent communication skills and concern for others—people who command the respect of company leaders and their peers. In return for their time and effort, advisers receive recognition as role models, the opportunity to improve their communication and social skills, and the rewarding feeling of helping others.

Once they have been selected, advisers take an in-house class in administering an assessment and planning tool called Career Anchors. Developed by Edgar Schein, a Sloan Fellows professor at MIT, this methodology posits a combination of competencies, motives and values that are essential to an employee's "real self." Employees must understand these "anchors"—such as autonomy or a penchant for accomplishing managerial tasks—to avoid being tempted into situations or jobs that will ultimately prove unsatisfactory. The anchors help employees identify goals; advisers help them design a plan to reach those goals.

The idea behind this tool is that people have different needs that must be met if they are to have successful and fulfilling careers. While employees may not always recognize or be able to articulate these needs, if they go unfulfilled, employees will not be productive or happy in their work. After talking to his senior adviser and going through the Career Anchors program, Watts, the unfulfilled systems analyst mentioned above, discovered that two of his an-

TI's Employee Development Center directs staff toward unexplored opportunities and encourages them to take responsibility for their own career development.

chors were the pure challenge of the work and the excitement of risk-taking. Before participating in the program, he had not been aware of how important risk-taking was to him.

Watts recalls the questions that brought him to the center in the first place. "My concerns were, how competitive am I in my current role? How do my skills stack up against people I'm rated against? Is there a possibility of bigger, higher-visibility projects? I also wanted to determine my course of action for the future. Where am I going? Do I need to look at different jobs within TI or outside?"

"My senior adviser was very direct with me. He said what he felt and didn't care if I agreed or not. There were no problems in telling me I was off track."

The adviser had been at TI longer than Watts and held various positions within the company. "I was gaining the viewpoint of an outsider looking in with no personal ties, but through the eyes of someone with experience."

Among other advice, Watts' senior adviser encouraged him to be more aggressive in pursuing the projects he wanted and to be more adaptable and less hung up on security. Acting on this advice, Watts has since changed jobs within the company twice at his own request, working on such high-visibility projects as the third-largest software system in TI's Defense Systems and Electronics Group and on a reengineering project for the company's accounting function.

"I saw opportunities and went for them, and I got them both," he says. "Before going through the center, I

would sit back and tell myself that people with more experience were going for it, and I might as well not try."

The center does not limit its services to career guidance and training referrals. It also provides other self-assessment tools and counseling services, such as degree planning, references to non-career-related counseling resources and information on retirement activities. Users can borrow books and tapes—both video and audio—on subjects ranging from time management to stress reduction. Many employees listen to the tapes during their commutes, turning rush hour into a learning experience. The audiotape library has been so popular that visiting employees have asked for a similar service at TI facilities in England, Germany and Portugal.

In addition, a group of employees—primarily secretaries, accounting clerks and software technicians—use the center as a place to meet and practice public-speaking and presentation skills. And Chinese-American employees gather there once a week to brush up on communication skills and study accent modification. The center assists in all these activities.

The Employee Development Center enables IS&S staff to reach a clearer understanding of where their strengths lie and how they fit into the organization. The center's emphasis on training and education encourages staff to grow into jobs that are constantly changing with advancements in technology, while peer counseling gives them a realistic view of their career opportunities and the dynamics of the organization. Taken together, these efforts help TI create and retain a talented workforce while demonstrating to employees that what may have seemed like a dead end can in fact be an open road. ☐

Sue Patterson is professional development manager for Texas Instruments Inc. Information Systems and Services Division, based in Dallas.



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The Speed of Light

A rise in bandwidth-gobbling multimedia technologies is causing organizations to take another look at fiber optics for their local networking needs

BY JOHN EDWARDS

Like electric cars and low-cal pizza, fiber optics is a technology revolution that appears to be forever "imminent." But after years of lofty promises from vendors and analysts, fiber optics is finally moving out of the research lab and into the real world. The promise of high-speed "glass" communication may at last be starting to take shape.

Actually, fiber has enjoyed several years of success in long-distance network-backbone applications. "A company may be using fiber optics for its WAN and not even realize it," says Joseph Baylock, a vice president at the Santa Clara, Calif., office of the Gartner Group. Companies that buy backbone services from one or more major carriers are almost certainly using fiber to move their data from site to site.

"In backbone services, fiber-optic networks are pervasive and the way people do business these days," says Baylock. But fiber's move into the desktop arena—into local area networks (LANs)—has been hesitant at best. Some users, planning for the future, are now joining vendors on

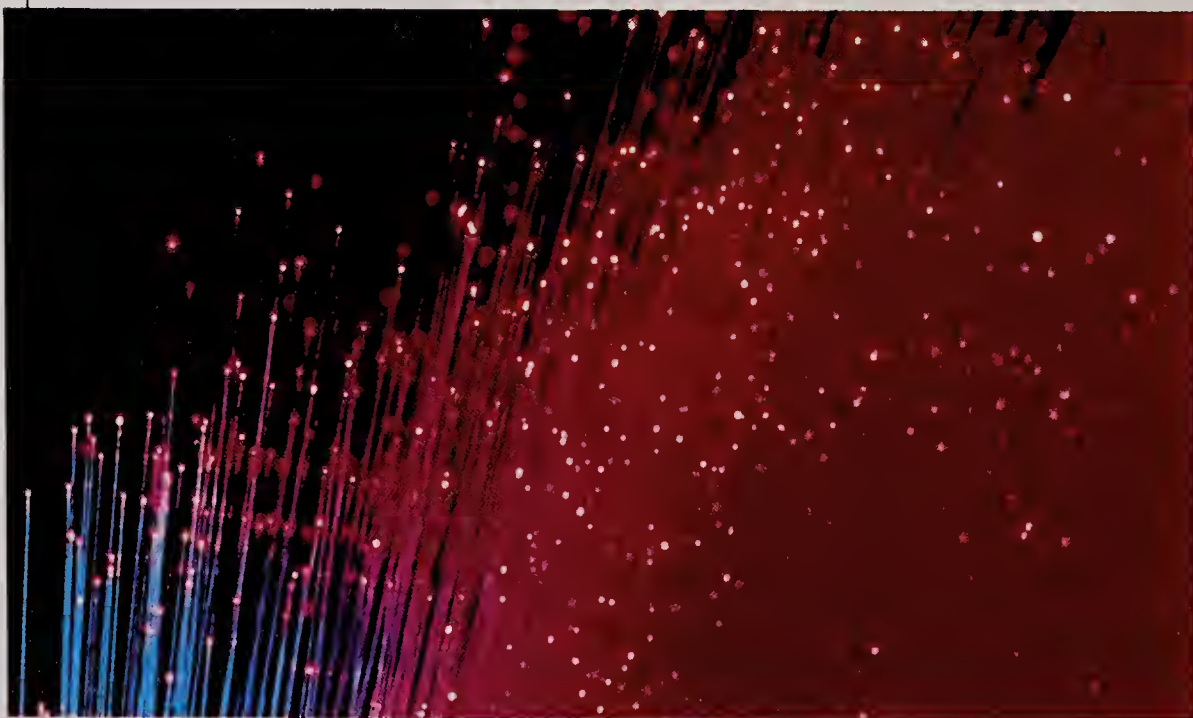
the fiber-optic bandwagon. There is a growing need to move large amounts of data among workstations quickly and cost-effectively, and while it can hardly be described as a groundswell, it is inspiring many managers to give fiber another look.

Whether used in a far-reaching backbone or a small office LAN, fiber has several technological advantages over traditional copper-based wiring, according to Bob Morrow, manager of public information at Atlanta-based BellSouth Telecommunications. "High speed, high capacity, durability and, most important, expandability are the major benefits fiber optics provide," he says. As more businesses move over to multimedia software products, according to Morrow, the shortcomings of copper wiring will become apparent.

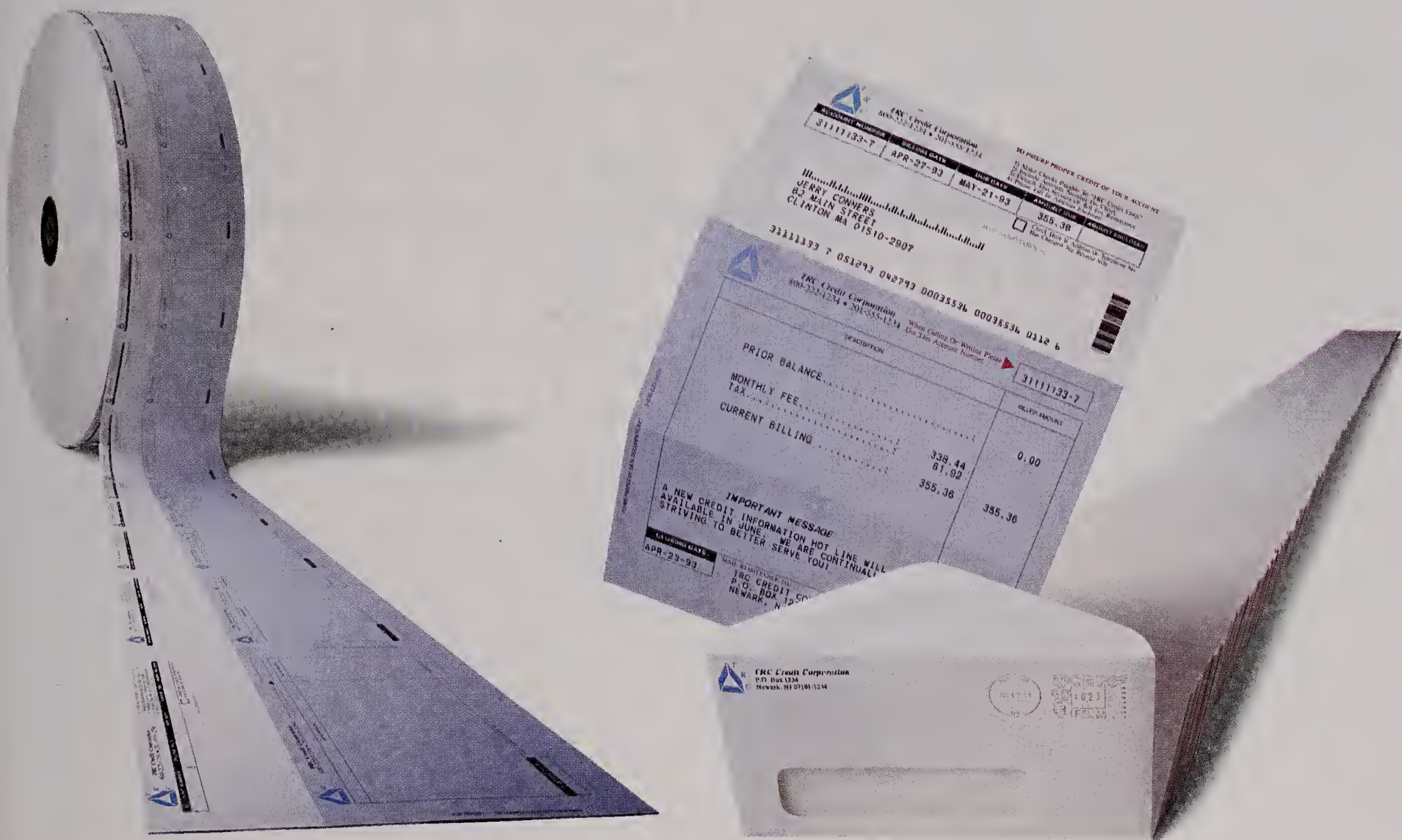
The high-speed bandwidth required by full-motion color video and other advanced technologies simply isn't feasible with existing types of copper wiring. Many firms are already laying plans for accommodating future data-transfer needs. "At BellSouth, we're seeing more and more new buildings going up with fiber pre-installed," Morrow says. "The idea is that even though the capacity of fiber optics isn't needed now, it will be in five to 10 years."

But not everyone is convinced that fiber is the way to go on the desktop. Many vendors involved with traditional copper-based communications are currently working to boost the technology's data-carrying capacity, according to Baylock. By the time companies need the extra bandwidth, copper may still be the most efficient, cost-effective medium.

"At the moment, fiber is actually losing steam," Baylock says. The main reason is its high up-front cost.



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	Copper-Based Technologies	Fiber Distributed Data Interface (FDDI)	Fiber Channel	Asynchronous Transfer Mode (ATM)
Advantages	Cost-effective, and they offer enough capacity to meet most users' current needs.	High-speed (100 Mbps) data-transmission rate.	Features all of fiber's performance, security and other benefits, plus the ability to connect to desktop systems, mass-storage peripherals and host systems. High speed (up to 100 Mbps in two directions) and a virtually unlimited bandwidth.	High-speed (100 Mbps) data-transmission rate. Users will probably be able to drop ATM in as an overlay to an existing network, cutting costs.
Drawbacks	Current speeds of 10 Mbps to 16 Mbps may not be able to meet the demands of tomorrow's multimedia technologies, although researchers are exploring ways to boost the performance of copper-based networks.	High cost compared with copper technologies. May become outdated before most companies need its data-moving power.	High cost. A new technology with limited product choices and support.	Currently unavailable.
Availability	Widely available.	Now.	Limited. The first products, meeting the standard's lower speeds, are just reaching the market. The technology won't be fully available until the late 1990s.	Mid-1994 for the first products. Organizations may have to wait until the 21st century to fully implement ATM at the desktop level.

Although fiber cabling is generally cost-competitive with copper wiring, installation and equipment costs can be much higher. For example, fiber users can expect to pay up to \$1,000 per adapter and \$1,500 per hub or concentrator port. Compared with such prices, traditional copper wiring appears to be a genuine bargain—even if data-transmission speeds are limited to the relatively paltry pace of 10 Mbps on Ethernet and 16 Mbps on token-ring networks. (Current fiber-based network backbones can run at speeds of up to 100 Mbps.)

But some organizations, especially those building new connections, are finding that the math works out. "I installed a fiber-optic cable two years ago, and it has worked great," says Richard Luke, information systems manager for the IBM Rocky Mountain Employees Federal Credit Union in Longmont, Colo. "Two of our buildings are separated by a parking lot, so when we were forced to update our hardware and software, I looked at the alternatives for data communications." The relatively short fiber run proved to be a cost-effective choice, Luke says. The expense consisted of buying and

burying the cable and connecting the copper wire to fiber-optic adapters. The configuration did not require LAN bridges or routers for the fiber cabling. "The cost of the complete fiber-optic link was about equal to the monthly costs for another leased 56-Kbps line for two years," Luke says.

Some of fiber's high initial cost can be amortized over the technology's extended life span, according to BellSouth's Morrow. "Unlike copper, fiber will last virtually indefinitely," he says. "Once it's been installed, users can basically forget any maintenance costs related to the medium itself."

Cost and bandwidth are not the only considerations. There are other pros and cons to take into account. "One drawback is that fiber-optic cable is still more fragile than copper wire, as far as vibrations and flexing go," says Luke. "But they got CD players to work reliably in cars, so perhaps fiber-optic cable can eventually be made more durable."

An important technological advantage of fiber, especially in these security-conscious times, is its resistance to hackers and other data thieves.

Since fiber doesn't generate spurious radio signals, an outsider must physically tap into the cable in order to steal data. This characteristic also offers a side benefit in the area of electronic interference: Fiber can neither generate signals that interfere with other computer equipment nor be affected by energy transmitted by other products. And since fiber carries light pulses rather than electrical signals, it cannot spark or carry lightning charges. This makes it suitable for installation in many locations where local fire codes prohibit copper wiring.

Fiber's physical characteristics make it appropriate for installation in crowded conduits and raceways. Fiber cables are smaller and lighter than their copper counterparts, weighing about 30 pounds to the kilometer. By comparison, a typical copper coaxial cable weighs approximately 200 pounds per kilometer. "Many companies are looking at fiber as a way to relieve space congestion in a building's vertical risers," notes the Gartner Group's Baylock.

There are basically three standards for fiber networking, in various stages of development:

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THE MAGAZINE FOR INFORMATION EXECUTIVES

Fiber Distributed Data Interface (FDDI)

Of all the fiber-networking technologies, FDDI is the most firmly entrenched and offers the widest selection of available products. FDDI is a 100-Mbps, token-ring technology designed for LAN applications. Actually, although it is not normally billed as a wide area technology, FDDI can be used to move data across considerable distances—up to about 180 kilometers. It can also be used to interconnect slower token-ring and Ethernet networks. The drawback is that FDDI eventually may be replaced by a pair of newer standards.

Fiber Channel

Fiber Channel has received a great deal of attention in recent months. Currently under review by an American National Standards Institute (ANSI) committee, Fiber Channel will let users transfer data at speeds of more than 100 Mbps over distances of up to 10 kilometers. It can

“They got CD players to work reliably in cars, so perhaps fiber-optic cable can eventually be made more durable.”

—Richard Luke

carry data in two directions simultaneously, also at speeds exceeding 100 Mbps.

Fiber Channel is a switched rather than a shared medium, giving it certain advantages over traditional LANs. One is that it doesn't become congested as workstations and other devices are added. In this respect, it works very much like a telephone network. With Fiber Channel, users have a temporary, direct connection that offers the option of full-bandwidth support for as long as the channel is needed.

As with all fiber technologies, Fiber Channel is more expensive to acquire and install than a copper network, but its backers hope that the price will fall in the years ahead. “Our belief is that it's going to be so widely adopted that the cost will come down to being fairly comparable to [copper-based] Ethernet today,” says Bob Williamsen, a product-line manager at Sun Microsystems Inc. in Mountain View, Calif. The Fiber Channel connection may eventually be integrated directly into systems, further reducing its cost, Williamsen notes. Sun, Hewlett-Packard Co. and IBM Corp. have formed the Fiber Channel Initiative, to advance Fiber Channel technology.

Asynchronous Transfer Mode (ATM)

Another up-and-coming fiber technology receiving intensive scrutiny is asynchronous transfer mode (ATM), a set of standards for sending large amounts of high-speed voice, data and video information simultaneously over a network. The technology

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supports speeds of up to 155 Mbps. IBM recently announced plans to invest nearly \$100 million a year in ATM technology. The Gartner Group estimates that the worldwide demand for ATM products will be \$275 million in 1993 and grow to \$3.1 billion by 1997.

"One of the appealing aspects of ATM is that it supports a multitude of different speeds," says Chris Baldwin, high-bandwidth network product manager for Southborough, Mass.-based Chipcom Corp., which is working with IBM on the development of a wide range of ATM-compatible products. According to Baldwin, ATM's rate-adaptability will allow organizations to adapt the ATM network to the needs of their own networks. By trading off speed and bandwidth against cost, end users will be able to arrive at the solution that best meets their requirements.

Since ATM is compatible with copper-based media, users will be able to launch their networks with the

**Since fiber doesn't
generate spurious radio
signals, an outsider must
physically tap into the cable
in order to steal data.**

traditional technology, then switch over to fiber whenever the need arises, Baldwin notes. Chipcom and IBM plan to demonstrate high-speed ATM network-backbone products early next year. They hope to provide desktop ATM-based technologies during the first half of 1994, he says. IBM will also offer ATM chips to network original-equipment manufacturers.

Sun's Williamsen believes that ATM and Fiber Channel will coexist in the years ahead. "Where very high-speed LANs are required, they'll often be done with Fiber Channel, and they'll then be routed over to ATM

when there's a distance requirement," he says.

But no matter which fiber standard an organization eventually adopts, the conquest of fiber technology over copper is inevitable, according to James Refi, distinguished member of technical staff at AT&T Network Cable Systems in Norcross, Ga. "Copper wires can handle a stream, but fiber is the right choice for an ocean," he says.

The only variable in the equation, according to Refi, is how long the changeover will take. "When the entire Library of Congress can be stored in a cabinet the size of a briefcase and transferred from Washington to Nairobi in a second, as it surely will, there is no denying that we are talking about a profound change in our society," he observes. "Fiber-optic technology will expedite this change." □

John Edwards is a freelance writer based in Mt. Laurel, N.J.

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Now Serving Windows NT

Windows NT now has a family of application servers designed specifically for it. Sequent Computer Systems Inc.'s WinServer family comprises four symmetric multiprocessing (SMP) servers: the WinServer 1000 and 1500 for client/server environments; the 3000, which supports large-scale LAN consolidation and transaction processing; and the 5000, targeted at mainframe-class computing.

The servers will initially be shipped with Intel 486-based processors and be Intel Pentium processor-ready for easy upgrades. They will come preconfigured with Microsoft Windows NT Advanced Server and network and database software.

The \$29,900 WinServer 1000 features two processors and 512MB memory. It also provides up to nine 3.5-inch disks and small computer system interface (SCSI) channels. Fault-tolerant data storage is optional. The 1500 model, also featuring two processors and 512MB memory, provides 21 disks and four SCSI channels for \$39,300. The 1500 provides optional fault-tolerant data protection and redundant power supplies.

Extending Windows NT applications to mainframe levels of computing and data capacity, the WinServer 3000 features six processors. Offering up to 16 SCSI channels, 1GB RAM, 192 disks and optional fault-tolerance and redundant power, the 3000 begins at \$75,300. The high-end system, the 5000, provides up to 16 processors in a platform architecture that scales to 30 processors. Its 384 disks, 32 SCSI channels and 2GB memory put it well within the range of mainframe-class performance, according to the company. Pricing begins at \$246,900. For more information, call 503 626-5700.

Report Righter

Want to call attention to details in your quarterly financial report or add visual information to your inventory lists? Alpha Software Corp.'s Report Styler can be used in a PC, mid-range or mainframe environment to format data from databases, accounting packages, word-processing programs and custom reports.

Report Styler enhances reports with fonts, shading and graphics. Reports can be saved as templates for future use, and the tool can be used as a repository, storing report-format styles for a number of departments. WYSIWYG layout allows users to see reports on-screen before printing them.

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While fax lines are a convenient way of exchanging business information, the need to key data into the host system can create a bottleneck in the workflow. Harvest Software Inc.'s forms data interchange (FDI) system automates the processing of faxed business forms, improving transaction workflow and reducing the cost of data entry.

The Harvest system extracts data from faxed forms such as purchase orders, patient records and time cards, enters it into host-transaction applications and faxes back a response with data supplied from the host computers. The system, which runs under OS/2 on Intel 486-based servers, integrates fax forms with applications operating in IBM mainframe environments; AS/400 applications will be supported in the future.

Harvest Master, an object-oriented design environment for creating and testing Harvest applications, enables users to create a form and graphically define data fields that map data to host-application screens. Harvest Operator receives and reads faxed forms using intelligent character-recognition techniques, then conducts transactions through live-host sessions and faxes back a response. If a transaction requires approval or verification, an Operator Assist function displays an image of the fax on-screen and highlights the relevant data.

Harvest's modular design allows for expansion as transaction volumes increase. Harvest Master costs \$35,000 per license, and Harvest Operator costs \$15,000 per license. For more information, call 408 245-2600.

A Client/Server Class Secretary

Administering client/server systems is like keeping track of your high-school friends. You know they're out there somewhere, working hard, and you hope they're in good health, but it's difficult to check up on them as much as you'd like. Vendors are trying to make it easier to keep tabs on distributed systems with products that address a few functions at a time. Norton Administrator, a new utility from the Peter Norton Group division of Symantec Corp., offers automated help with network inventory, software distribution and software metering.

Network managers can configure the inventory function to scan for installed hardware and software. Inventory lists are updated when users log on. The software-metering function validates user software licenses to help enforce proper licensing. The software-distribution capability allows for individual or global software distribution.

The Microsoft Windows product costs roughly \$30 per node for a 1,000-node pack. Contact Symantec at 310 453-4600.

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Page numbers refer to the first page of the article(s) in which the company is mentioned. This index is provided as a service to readers. The publisher does not assume any liability for errors or omissions.

Company Index

3M.....62
AT&T.....18, 70
AT&T Network Cable Systems...84
Alpha Software Corp.....92
Avid Technology Inc.....18
Bank of America.....18
BellSouth Telecommunications...84
CEO Institutes, The.....38
Cataract Inc.....70
Chipcom Corp.....84
ClubCorp International.....38
ClubCorp Systems.....38
Comprecare.....18
Compression Labs Inc.....70

Computer Associates
International Inc.....38, 54, 62
Computer Dynamics Inc.....70
Corning Inc.....70
CS First Boston Group Inc.....70
CS Holding.....70
DataBeam Corp.....70
Digital Equipment Corp.....54, 62
Einstein and Sandom Inc.....18
Electric Power Research Institute.18
Extended Intelligence Inc.....18
Fel-Pro Inc.....54
Ford Motor Co.....62
GTE Vantage Solutions.....70
Gupta Technologies Inc.....54
Harvest Software Inc.....92
Hewlett-Packard Co.....18, 28, 84
IBM Corp....18, 54, 62, 84, 92, 96
Intel Corp.....92
International Flavors
and Fragrances Inc.....54
International Media Partners....38
International Telecommunications
Union.....70
Keir Manufacturing.....18
London Life Insurance Co.....54
Microelectronics and Computer
Technology Corp.....18
Microfield Graphics Inc.....70
Microsoft Corp.....54, 92
NCR Corp.....54
NEC Technology Inc.....70
Northwest Airlines.....96
OpenConnect Systems Inc.....54
Oracle Corp.....54

Pacific Bell.....18
PenUltimate Inc.....18
Performance Computing Inc.....54
PictureTel.....70
Polycom Communications.....70
Republic Airlines.....96
Roadway Express Inc.....54
Roadway Services Inc.....54
SAS Institute Inc.....54
Semiconductor Research Corp....44
Sequent Computer Systems Inc..92
Sikorsky Aircraft Inc.....54
Smart Technologies Inc.....70
Sony Corp.....62
Sprint Corp.....18
Summit Information Systems Inc..54
Sun Microsystems Inc.....84
Sybase Inc.....54
Symantec Corp.....92
Template Software Inc.....96
Texas Instruments Inc.....80
Thomson Consumer
Electronics Inc.....62
Toshiba International Corp.....62
Trinzic Corp.....54
Ultramar Inc.....54
United Technologies Corp.....54
VTEL Corp.....70
Wheels Inc.....18
Wright Express Corp.....18

Advertiser Index

AT&T.....43
Bell Atlantic.....51

CIO Publishing Inc.....89, C3
Cisco Systems Inc.....11
ComNet.....69
Computer Associates International
Inc.....2, 61
Daly & Wolcott.....27
Digital Equipment Corp.....C2
EDS.....78
IBM Corp.....7, 31, 32, 47, 69
IMRS.....35
Information Builders Inc.....15
Informix.....8
Ingres.....86
Interleaf Inc.....82
MicroAge Computer Centers Inc..C4
Micro Focus.....19
NCR Corp.....52
National Education
Training Group Inc.....40
OpenConnect Systems Inc.....39
Pennant Systems.....22
Prism.....57
Racal-Datcom Inc.....25
Sequent Computer Systems Inc...4
Southwestern Bell Telephone
(Regional).....31
Sprint Corp.....67
SunSoft.....90
Sybase Inc.....21
SynOptics Communications Inc...16
Texas Instruments Inc.....12
Unisys Corp.....36
Unitech Systems Inc.....29
VTEL Corp.....74
Xerox Corp.....77, 85

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Maintaining The Jet Set

A new maintenance-scheduling system has dramatically reduced the number of unanticipated layovers for Northwest Airlines' aircraft

Trying to schedule that 747 for its routine and required maintenance can sometimes seem like flying blind through a hailstorm in the Himalayas on one engine. Any number of obstacles, both foreseen and unforeseen, might crop up—like not being able to find mechanics, parking space in the repair hangar or parts from Peoria. All of this is further complicated by an ever-changing maze of federal regulations.

Northwest Airlines' manual system for scheduling repairs was already overtaxed when the Minneapolis-based company joined forces with Republic Airlines, virtually doubling its fleet to 360 aircraft overnight. There weren't nearly enough planners to handle scheduling for all those planes. The airline wanted its maintenance to be consistent throughout the fleet, and it wanted to be able to analyze the long-range impact of various eventualities.

In its search for an automated system, Northwest's objective was to increase the time between maintenance visits, taking into account "the constraints of manpower, parts and facilities," according to Doug Heuer, applications specialist, information services for technical operations. "Depending on the work

needed, [maintenance] can take an aircraft out of service for a week or a month, and some of the parts to be replaced have order lead times of 12 to 18 months. You can't order those kinds of parts in bulk and have them sitting around in a warehouse. So you have to balance all those variables."

The answer appeared in the form of a system called Snap, from Template Software Inc. of Herndon, Va. What attracted Heuer and Northwest's major-maintenance planners to Snap was its knowledge and inference engines and object-oriented technology, as well as its graphical user interface (GUI). "Snap is not a canned solution," says Heuer. "It's a developable tool, an expert system that gives you a good solution, then lets you play with it."

Snap, which Northwest runs on an IBM Corp. RISC Server/6000, enables planners to run various "what-if" scenarios for long-range planning. Like "what if we bring in a few extra aircraft on Monday? If we add 400 maintenance hours this week, will that cause a jam-up six months down the road?" One of the primary reasons Northwest chose the Snap system was that the Template people were willing to work side by side with Northwest staff to develop these kinds of custom solutions to fit their complex, ever-changing parameters. "It's not

a turnkey environment," Heuer explains. "We were able to develop expertise in-house so we could work out modifications on our own without having to go outside the corporation for new solutions."

Government inspections drive the scheduling of regular maintenance. If maintenance planners know an aircraft's current condition and maintenance history and which resources are available when, they can include other work—painting, engineering alterations, landing-gear adjustments—in the regularly scheduled visit.

The Snap system creates a kind of macro "to do" list for each aircraft. The planner figures out what needs to be done and enters into the computer the required man-hours, parts and facilities. The system matches the plane with a date when all the requisite elements will be available.

Northwest can now consolidate into one visit work that previously would have required two or three. In fact, the airline has become so good at scheduling its own planes that occasionally a vacancy occurs in its shop, and it can do contract work for other carriers, garnering additional revenue.

Northwest estimates that the new system is saving it more than \$3 million annually.

—Melanie Menagh

Melanie Menagh is a freelance writer in Brooklyn, N.Y.

VITAL STATISTICS

Organization: Northwest Airlines, Minneapolis

Application: Long-range major-maintenance planning for aircraft

Sponsor: Doug Heuer, applications specialist, information services for technical operations

Technology: Template Software Inc.'s Snap system; IBM RS/6000 server and workstations

Scope: Major-maintenance planning staff

Objective: To increase the time between maintenance visits

Payoff: Planes less frequently out of service; resources used more efficiently; more than \$3 million saved annually

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